The Chemical Age

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Bottle-washers to German Professors

DURING the past few days two notable opinions as to the present condition of chemical science in this country have fallen from well-known chemists. Professor Morgan at Birmingham, on Saturday, said that no longer do British chemists occupy the position of bottle-washers to German professors. In London, on Tuesday, Dr. Levinstein referred to the popular impression that chemically we are behind other nations, especially Germany, and confidently predicted that the pure chemistry exhibit at Wembley next year would for ever dispose of that illusion. If all our chemical leaders who share their estimate of British chemical science would keep on telling the public the same thing, and somebody would see that their opinions were as widely circulated in the daily Press as Dr. Levinstein's was this week, the British public would presently come to believe it. That was largely the way in which Germany built up her reputation. It was not enough that German chemists did good work in their laboratories; they let their own countrymen and the world at large know all about it. As a result they acquired a reputation which went even beyond their admittedly high attainments. Here, as a leader of our fine chemical industry recently remarked with a touch of bitterness, the activities of some of our own professors in the role of candid friends are becoming rather more than a joke. It is time to change a bad fashion, and to begin to tell the public more about our merits and to dwell a little less lovingly on our defects.

There are signs that the need of a change of attitude is appreciated, and ground for thinking that such a change is justified. One sign is the organisation of the pure chemistry exhibit at the British Empire Exhibition next year. Split up into various sections, each presided over by some distinguished chemist, the exhibit will be designed to illustrate the remarkable advances made in chemical research in this country during the last thirty years. The exhibit in itself is a challenge, for the societies who are co-operating in the demonstration would hardly be likely to make the adventure unless convinced that there was something well worth demonstrating. In particular, a principal object will be to show that to-day we have in our universities and elsewhere really great schools of chemistry capable of supplying ideas and men for the fertilisation of our chemical factories—which otherwise, in Dr. Levinstein's picturesque phrase, would be simply an arid waste of pipes and tubs and vats and buildings.

If, however, the universities attract students and turn out a stream of qualified chemists, it is necessary that industry should steadily absorb them if the fruits are to be won. That is where the importance of a close relation between the science and the industry comes in. The universities cannot afford to maintain a high teaching service unless students attend in sufficient numbers; and students will not attend in sufficient numbers if, at the end of their courses, they find no openings available. The science needs an industry to support it and to utilise its output; the industry equally needs a science which will be constantly refreshing it with new ideas. At the meeting of the British Association of Chemists last week it was suggested that something should be done to induce industries to introduce new or to extend the existing chemical services. We have suggested the same thing more than once, in the belief that British industries have not absorbed chemistry to anything like their full profitable capacity. It is all a question of education, and the education of the British employer must be undertaken by the chemist himself, or by the societies which safeguard his interests. The fact, however, remains that, in spite of the number of societies in existence, none can find time to organise the necessary attack on industry, although all of them might find profitable employment in a combined campaign. The sufficient answer to all appeals is that it has never been done before!

Merchants and the Customs

THE question referred to in our last issue—namely, the right of the Customs themselves to assess the value of chemicals imported under Part I of the Safeguarding of Industries Act, and to override the invoice value, even where it is admittedly *bona fide*—has since been the subject of an interview between the Chemical and Dyestuff Traders' Association and the authorities. One may be sure that the case for the merchants would be stated by Mr. F. T. T. Reynolds reasonably and with a wide knowledge of trade practice, but the Customs authorities, it is understood, are disposed to adhere to their claim. In that case, a reference to an independent authority would appear to be necessary. There seems to be substance in the merchants' plea that if the Customs desire to add to the normal taxation of goods that come in at a price unfairly below that of British products, the proper procedure would be under Part II, which specifically deals with "dumping." Merchants have undoubtedly suffered considerable inconvenience owing to recent legislation, and have lost heavily by the restrictions on foreign imports. To the extent that this is necessary to the welfare of British production, as defined in law, they would, of course, have to submit, but at a time when the whole question of preference seems about to be revived the Customs would be well advised to keep clear of doubtful boundary lines.

Fuel Blending and Smoke Prevention

DURING the past week there has been added to the "Gas and Fuel" series of textbooks published by Ernest Benn, Ltd., a volume which should be in the hands of all industrial consumers of fuel, not merely for the reason that the suggestive ideas of the author should go a long way towards enabling fuel expenditure to be substantially curtailed, but because he deals in an exceptionally sensible manner with the vexed and hackneyed subject of smoke prevention. We are all more or less familiar with the baneful influences of coal smoke, but we are never likely to be stirred to remedial action by the one-sided moralising of those who have no acquaintance with the difficulties which beset the practical consumer, and whose opinions are frequently deprived of any value by gross exaggeration. On the other hand, Mr. Nicol, in his book *Coke and Its Uses*, to which we refer, has spent the best part of his life amongst fuel-consuming devices, and he has no hesitation in bringing to the front the palpable misapprehensions under which practical men, legislators, and an unobservant public continue to labour.

In the first place, the popular but erroneous conception of visible smoke issuing from a chimney is that it is a combustible gas. It is, in fact, seldom that those whose voices are loudest in protest understand that the product emitted is largely water vapour coloured with a relatively minute quantity of deposited carbon. Purely from the standpoint of fuel economics it is worth bearing in mind that the value of the carbon which produces the colour of black smoke is relatively insignificant, and represents probably less than one per cent. of the carbon contained in the coal. Soot, however, has exceptional light-absorbing properties, a single grain being sufficient to colour a cubic foot of gas. It would be dangerous to permit such an argument to be advanced in justification of smoke emission, for the baneful influence of the light-obscuring effect of smoke upon health and plant life is amply proved. Albeit, it is as well that it should be generally understood that the effect of the other constituents (sulphurous acid and carbon dioxide) of the emitted vapour is relatively insignificant. Moreover, while, if industry is to continue, it is impossible to avoid the presence of these two constituents, the same is not the case with the soot particles. Mr. Nicol shows how the latter may be practically eliminated by the wise choice of fuels and by fuel blending. It is sufficient to add that by attacking the problem from the standpoint of fuel selection some of the largest power stations in the country have been able to obtain the desired result, and the whole matter would now seem to be one of educating the delinquents in the successful methods which are available.

A Chemical Milestone

AN event of some historical interest to chemical organisation occurred on Wednesday evening. For the first time in their history the Chemical Society, the Society of Chemical Industry, and the Institute of Chemistry dined ceremonially together. Probably most of the members present had already sampled one another's port on other occasions, but never before had the trinitarian basis of unity been formally professed. It was fitting that the occasion should be signalised. The food, we understand, was of a rare excellence, the wines chosen with extra nicety, the arrangements a pattern of order and taste, and the speakers selected with a view to the right contrapuntal effect—a happy blend of pre-arranged spontaneity and decorous after-dinner abandonment. It all seems to have gone off very well. But whether from an innate modesty, like that of the violet, or from a sense of the boldness of the experiment, or from a total incapacity to see any public side to it at all—the affair was carefully screened from the outer world. Hence this simple notification that another chemical milestone was secretly passed this week, very much as ships pass in the night.

The Provincial Point of View

THE members of the Manchester Section of the Institute of Chemistry, at their last meeting, raised a point which often causes trouble in cases where the organisation of national bodies is centralised in London. The point is the expense and inconvenience in which a provincial member of the Council is involved in attending meetings in London. There are two ways of meeting the difficulty—one is to pay the provincial member's expenses out of the common funds; the other (which may be an alternative or merely an addition) is to hold the meetings in rotation outside London. Even where the provincial member's expenses are paid, attendance involves far more loss of time than it does in the case of the London member, and such payment would not completely equalise the position.

The difficulty, as we have said, is not at all peculiar to the Institute; it is raised again and again in con-

nection with national bodies, and it implies nothing in the shape of disrespect to the headquarters' organisation, nor any lack of faith in the fairness of London colleagues. It is, however, often difficult for the London members, able to attend with comparative ease, to appreciate the provincial point of view, and also they fail to see that London, quite unconsciously, may control questions of policy to an undue degree. There is, in this case, no sort of suspicion but merely a desire, as we take it, to make the Institute completely democratic. Whatever may be the case here, in others the policy of holding meetings in different centres has had a good effect in stimulating local activities, and only when London members have had to travel a few times up to Manchester or Newcastle, or even Glasgow and Edinburgh, do they see how reasonable the provincial claim is. At a time when the Institute is actively strengthening its organisation throughout the country, the point raised from Manchester may be quite worth considering.

The Peril of Inflation

THE Premier's emphatic declaration against the policy of inflation has not only restored confidence to the city, but brought back a much needed relief of mind to the commercial and industrial world as a whole. There are quite enough uncertain factors in business to-day, and the prospect which was opened up a week or two ago of political dabbling with the value of the £ would surely have been the last straw. It is surprising, after all that the Continent has passed through in the last few years from the interference of the politician in the money market, that there should still be those who would have us dabble in this same suicidal business. Mr. Baldwin's speech on other matters left the door open, or at least ajar, for conjecture, and did not preclude the possibility of a variety of interpretation, but when it came to currency and inflation and deflation, he used words which are quite incapable of misunderstanding. Business men can now, therefore, proceed with the knowledge that any fluctuation in the value of sterling will be natural, that a movement up or down will be the result merely of ordinary causes, and that no political consideration, at all events so far as this country is concerned, will be allowed to influence price. Only on such a basis can confidence safely rest.

A Metallurgical Supplement

WITH the beginning of the New Year we propose to introduce in THE CHEMICAL AGE a new feature, which should increase its value to existing readers and extend our service into a wider field—namely, a metallurgical supplement. This is in response to many suggestions from readers who are interested in metallurgical problems, and who recognise the increasingly close connection between chemistry and metallurgy. For the present the supplement will appear monthly, and it is hoped to provide a useful monthly review of technical developments, commercial conditions, and movements of general interest to the industry.

Points from Our News Pages

"The Chemistry of Insulin" is discussed in an article by Mr. Norman Evers (p. 478).

An artic'e appears by Mr. S. N. Brown on "The Valuation of Glues and Gelatines" (p. 480).

Dr. Herbert Levinstein spoke on Tuesday in London on "The Progress of Chemical Science" (p. 483).

Reports are published of the Streatfeild Memorial Lecture by Mr. E. M. Hawkins (p. 487) and a paper by Mr. I. E. Weber on "Hydrogen Peroxide Bleaching" (p. 488).

The improved outlook in the London Chemical Market is maintained, and further advances in price are expected (p. 495).

Business in the Scottish Chemical Market during the past week has been fairly satisfactory considering the conditions on the Continent, according to our Report (p. 498).

The Calendar

Nov.		
5	Royal Institution of Great Britain: General Monthly Meeting. 5 p.m.	Albemarle Street, London, W.1.
5	Society of Chemical Industry (London Section): "The Use of Hydrogen Cyanide for the Fumigation of Ships." Dr. G. Monier-Williams. 8 p.m.	Burlington House, Piccadilly, W.1.
5	Institution of the Rubber Industry (London Section). 8 p.m.	Engineers' Club, Coventry Street, London.
6	Mineralogical Society: Anniversary Meeting. 5.30 p.m.	London.
6	Society of Chemical Industry (Birmingham Section): "The Amino Acetophenones as Colour Intermediates," by Professor Morgan and Mr. J. E. Moss. 7.15 p.m.	University Buildings, Edmund St., Birmingham.
8	Institute of Metals (London Section): "Some Impressions of Non-Ferrous Metallurgy." Dr. W. Rosenhain. 8 p.m.	Royal School of Mines, South Kensington, S.W.7.
8	Chemical Society: Van der Waals Memorial Lecture, by Dr. J. H. Jeans. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London.
9	Society of Dyers and Colourists (Manchester Junior Section): "Ice Colours." Mr. K. H. Saunders.	Manchester.
9	Institute of Metals (Sheffield Section): "Substitutes for Platinum." Mr. E. A. Smith. 7.30 p.m.	University, St. George's Square, Sheffield.
10	Finsbury Old Students' Association: Annual Dinner. 7 p.m.	Engineers' Club, London.
12	University of Birmingham Chemical Society: "Colour and Chemical Constitution." Mr. V. E. Yarsley.	Birmingham.
12	Institute of Metals (Scottish Section): "Nickel Alloys." Mr. D. Turner. 7.30 p.m.	39, Elmbank Crescent, Glasgow.
13	Northern Polytechnic Institute, Chemical Association: "Drops." (Experimental Lecture.) Mr. J. Nicol. 8 p.m.	Holloway, London, N.7.
13	Institute of Metals (Birmingham Section): "X-Rays and Crystal Structure." Dr. H. B. Keene. 7 p.m.	Chamber of Commerce, New Street, Birmingham.
26	Chemical Industry Club: Annual Dinner. 7.30 p.m.	Connaught Rooms, London.

The Chemistry of Insulin.

By Norman Evers, B.Sc., F.I.C.

In this article the author reviews and conveniently summarises the various stages in the discovery, commercial production, physiological effects and chemical properties of Insulin.

THE outstanding fact in the disease known as *diabetes mellitus* is the inability of the tissues to utilise the glucose in the blood. Glucose, therefore, accumulates in the blood, with results which are well known. Insulin is a hormone or active principle secreted from the pancreas into the blood; in its absence the tissues are unable to utilise the blood sugar, with the consequent production of *diabetes mellitus*. The administration of insulin rectifies this error in carbohydrate metabolism, enabling the tissues to oxidise glucose in a normal manner, and in most cases restores the sufferer from this most trying of diseases to a normal condition as long as the treatment is continued and the dietary is properly controlled. The importance of this discovery in the history of medicine and its interest to the physiologist and chemist are therefore very great.

The viewpoint of biochemists on the chemical interactions in the living organism has been much altered of late by the realisation of the importance of substances of intense physiological activity or of vital importance to the organism which occur in such minute quantity that the ordinary methods of chemistry fail before the difficulties of their isolation. This is due not only to the minuteness of the quantities in which they occur but also to their unstable nature and ready destruction when subjected to ordinary chemical methods. Interesting examples of such bodies are the vitamins, the active principles of pituitary gland, and insulin.

There are undoubtedly many other internal secretions of a similar nature having specific actions; but it should be remarked that it is only in those cases where there is a definite method, either physiological or chemical, of testing for these bodies, that it is possible to attempt their concentration or isolation. In most cases such methods are physiological, and it is consequently to the physiologist that we owe their discovery. The chemist has followed in devising methods for the extraction and concentration of these active principles.

Early Work

The existence of an internal secretion of the pancreas which controlled carbohydrate metabolism was an accepted fact many years before its separation in an active form was successfully carried out. The story of insulin opens in 1885, when it was shown by V. Mering and Minkowski that complete extirpation of the pancreas from dogs caused the appearance of symptoms practically identical with those of severe human diabetes within a few days. Shortly afterwards Lepine suggested that this was due to the production by the pancreas of some secretion which controlled carbohydrate metabolism, and this view gained support when Minkowski showed that if a portion of the gland was grafted beneath the skin before the removal of the pancreas the occurrence of diabetic symptoms was delayed until the grafted portion of gland degenerated. Subsequently it was suggested by Schafer that the groups of cells in the pancreas known as the "Islets of Langerhans" were associated with the production of the internal secretion for which he suggested the name "Insuline." These islets are small groups of cells occurring in large numbers in the pancreas, and are more richly supplied with blood capillaries than the acinous cells which produce the digestive enzymes. It was further shown that ligation of the pancreatic ducts, while causing the degeneration of the acinous cells, leaves the islets of Langerhans unaffected and does not cause diabetes. The evidence in favour of a secretion from the islets, the absence of which was the cause of *diabetes mellitus*, was now fairly complete, though, whether actual degeneration of the cells of the islets in cases of severe diabetes occurred, was for some time a debatable point, but with improved histological methods this is now known to occur, at any rate in one of the two varieties of cells of which the islets are composed.

In the following years a number of attempts were made to prepare an extract of the pancreas which would cause a reduction of the blood sugar when administered to the diabetic subject but with no definite result. In view of our present knowledge that insulin is destroyed by trypsin and pepsin or by heat, and that careful attention must be paid to the reaction of the extracting medium, this is scarcely surprising. Moreover, the convulsive attacks in rabbits now known to be caused by a reduction of the blood sugar below a certain concentration were formerly misinterpreted as being due to the presence of toxic substances in the extracts. These facts sufficiently explain the earlier failures in this direction, especially as many of these preparations were administered by the mouth.

Late in 1920 Dr. F. G. Banting, then assistant physiologist of Western University, London, Ontario, conceived the idea of preparing an extract of the pancreas after the cells which secrete the digestive enzymes had degenerated owing to ligature of the ducts. This work was carried out in conjunction with Dr. Best at the University of Toronto under Professor J. J. R. Macleod. Intravenous injections of extracts so prepared invariably caused a reduction in the blood sugar of diabetic dogs. Extracts were also prepared from the pancreas of fœtal calves, which is free from tryptic enzymes at about the fifth month, and these had similar effects. With the aid of such injections a depancreatized dog was kept alive for 70 days.

These results were highly encouraging; but such methods were of course useless for the practical production in quantity of insulin as, following Schafer's suggestion, the active principle was named. It now seemed probable that insulin might be separated in active form provided that a method could be devised by which it could be extracted from the fresh gland without giving the trypsin an opportunity of attacking it. With the assistance of J. B. Collip such a method was evolved. Insulin was found to be soluble in 80 per cent. alcohol, whereas trypsin is completely insoluble, but insulin is fairly completely precipitated by 95 per cent. alcohol. On these facts was founded the original process for insulin preparation.

The perfectly fresh ox pancreas glands were finely minced with sufficient strong alcohol so that the alcoholic strength of the extracting menstruum was 50 per cent. Trypsin has no activity at this concentration and is only dissolved to a small extent. After pressing out and filtering the liquid, sufficient strong alcohol is added to bring the strength to 80 per cent., which precipitates the remainder of the trypsin. The liquid after filtration is concentrated at a low temperature in vacuo until the alcohol is removed and the fat separates out. The latter is removed and the syrup is again diluted to 80 per cent. strength with strong alcohol. A certain amount of syrupy salt solution and protein matter separates and is removed. The clear alcoholic solution is now diluted with absolute alcohol to 95 per cent. strength. The crude insulin slowly precipitates as a white powder. The temperature is kept as low as possible throughout the process. The crude product thus obtained may be and has been used for injection, but further purification is advisable by one of the methods given below. The activity of the product is tested by finding the dose required to reduce the blood sugar of a fasting 2 kilogram rabbit from its normal value of about 0·11 per cent. to about ·04 per cent. and to cause convulsions. This test is the most reliable yet devised, but it cannot be described as accurate, the results often varying by as much as 20 per cent. A more accurate method of testing is highly desirable, as the losses caused by an error of testing in the case of such costly material as insulin may be very considerable.

The rabbit dose of the crude material thus prepared is about 10 mg. the purest products being as low as 5 mg. The yield by this method is about 50–70 rabbit doses per kilogram of fresh pancreas glands.

Improvements on the Original Process

The two chief problems before those who attempted to improve on this process were (i.) the improvement of the yield, if as was generally supposed the amount of insulin extracted from the gland by this method represented only a fraction of that actually present, and (ii.) the purification of the final product.

The use of an acid menstruum for the extraction of the insulin from the pancreas was a fairly obvious suggestion

considering the known inhibitory effect on the activity of the trypsin, and nearly all the improved processes employ acid in the original extraction. In one process patented in America the pancreas is minced with an equal volume of boiling water in order to destroy the enzymes, cooled and filtered. By the addition of sodium benzoate followed by hydrochloric acid there is formed in the liquid a precipitate of benzoic acid by which the insulin is removed from the solution. The benzoic acid with the insulin is separated and after washing and drying is dissolved in 80 per cent. alcohol and filtered. The alcohol is then evaporated off and the residue shaken with ether and water. The aqueous layer containing the insulin is separated off while the benzoic acid remains in the ether layer.

In a further patented method, extraction with dilute hydrochloric acid and copper sulphate solution is used, the addition of copper sulphate being for the purpose of retarding extraction of protein matter. The extract is filtered and half saturated with ammonium sulphate. A precipitate of proteose matter containing the insulin rises to the surface. This precipitate is redissolved in water and treated by the benzoic acid adsorption method as above described. Doisy, Somogyi and Shaffer describe a method of extraction using 40 c.c. of 10N . H_2SO_4, 1,200 c.c. of 95 per cent. alcohol and 300 c.c. of water for each kilo of pancreas. The liquid is pressed out and the residue further extracted with 60 per cent. alcohol. The combined extracts are neutralised with sodium hydroxide until faintly acid to litmus and filtered. The alcohol is then evaporated off in a warm air current. The solution is slightly acidified and half saturated with ammonium sulphate. The precipitate which rises to the surface is separated and extracted with 75 per cent. alcohol. The clear alcoholic liquid is then precipitated at 95 per cent. alcoholic strength as in the original process, when the crude insulin is thrown down. The authors state that they obtain about 250 rabbit doses per kilo by this process, a yield which is more than three times that of the original process. Professor Krogh of Copenhagen has used a modification of this process, by which he has obtained over 1,000 rabbit doses per kilo. Professor Krogh uses pig's pancreas which is frozen into a solid block before disintegration. A more acid menstruum is used than in the Shaffer process, otherwise a similar procedure is adopted.

The Purification of Crude Insulin

Insulin obtained by any of the above processes is very impure. It contains a large proportion of inorganic salts and nitrogenous matter and requires further concentration before solutions for injection can be prepared. The purest insulin obtained at this stage has a rabbit dose of 5 mg. Insulin is found to form a precipitate at pH 4·7 to 5 which dissolves on the addition of either acid or alkali. This "isoelectric point" precipitation is used for the purification of insulin, by precipitating the insulin at pH 4·7 to 5, the product so obtained being so concentrated that a dose of less than 0·5 mg. sends a 2 kg. rabbit into convulsions.

Dudley has devised a method of purification by which the insulin is precipitated as picrate from a solution of the crude material. The picrate is collected and converted into the hydrochloride by treatment with alcohol containing hydrochloric acid. The hydrochloride is dried by washing with alcohol and ether and is a light white powder readily soluble in water. 0·5 to 2 mg. is usually the rabbit dose of the hydrochloride thus prepared. On the addition of strong acid to a solution of this hydrochloride a precipitate is formed which is the most concentrated preparation so far obtained, the rabbit dose being as low as 0·25 mg.

The Chemical Properties of Insulin

Even in the purest form yet obtained, insulin probably consists chiefly of impurities associated with a very small amount of the active principle. Phosphorus is absent from the purified product but organic sulphur is present. Dudley states that insulin "is in fact, a substance exhibiting the characteristics of a protein derivative, in which, of the common tests applied in such cases, the biuret and those for the iminazole ring (histidine) and for sulphur are the only striking reactions. The fact that the Paüly reaction for histidine persists strongly even in the most concentrated preparations of insulin is interesting because this reaction is also positive with other substances of strong physiological activity such as the active principles of the pituitary gland. Insulin, however, is completely precipitated by picric acid, by uranium acetate, or phosphotungstic acid and will not pass through a collodion membrane. It is therefore either itself a complex body of protein-like structure, or if it has a more simple structure, is combined with proteins from which it is not easily dissociated. At or near the "isoelectric point" insulin is liable to be adsorbed from solution by such substances as kieselguhr, filter paper, etc., but it may be removed by washing with dilute alkali or acid. Insulin is rapidly destroyed by either trypsin or pepsin. Dudley has shown that insulin is fairly stable in acid solutions. Heating on a boiling water bath for 30 minutes in N/10 sulphuric acid causes no appreciable loss of activity though an hour's heating partially destroys it. In slightly acid solution ($P_H = 3$) insulin is stable for considerable periods at the ordinary temperature and the writer has kept it at 37° C. for 15 days without loss. As the acidity is reduced the insulin is less stable to heat and in alkaline solution is rapidly destroyed.

Other Sources of Insulin

From the technical point of view pancreas gland is not an ideal raw material for the manufacture of insulin. The fact that large quantities of glands have to be obtained in a fresh condition and immediately treated is a serious objection, and only in certain centres in this country can sufficient glands be obtained for large scale manufacture. Moreover, this country is at a disadvantage as compared with America in supplies of fresh glands. The discovery of a better source of insulin would therefore be an advantage to the manufacturer. As far as vertebrates are concerned insulin appears to be confined to the pancreas, but Collip has noted the presence of a substance having blood sugar reducing properties similar to insulin in clams, yeast, and in various rapidly growing vegetable materials. This substance, which he has called "glucokinin," is not the same as insulin, its action in reducing the blood sugar being much more delayed. It is not known whether these bodies have the same therapeutic effect as insulin, their action may indeed be entirely different, such as the stimulation of insulin production, which would make them valueless for therapeutic use in diabetes. In the present state of our knowledge, therefore, there is no alternative source to the ox or pig pancreas for the commercial production of insulin.

The Mode of Action of Insulin

The sugar in the blood of a normal subject partly passes to the tissues where possibly through one or more intermediate products it is oxidised to carbon dioxide, the other part is polymerised to glycogen and is stored as such chiefly in the liver and muscles.

In diabetes, for some reason at present obscure, the tissues are unable to utilise glucose nor is it capable of being converted into glycogen. Glucose, therefore, accumulates in the blood and the excess is excreted in the urine. The effect of insulin is to correct both these defects in metabolism. The diabetic subject is enabled both to utilise glucose and to store it as glycogen. A simple explanation appears to be that glucose before it can be used in both of these ways must be converted into some intermediate product through the agency of insulin. In this connection the work of Winter and Smith is of interest. They have produced evidence to show that the sugar in normal blood is not the ordinary α or β glucose but the isomer known as γ glucose, but that in diabetic blood the glucose is not in this condition.

So far the question appears fairly simple; but we have to take into consideration also the effect of insulin on normal blood sugar. As has been stated the injection of insulin into a normal person causes a reduction in the blood sugar. What happens to this sugar? It does not form glycogen because the glycogen store is diminished—glycogen, in fact, passes into the blood as glucose to make up the deficiency. It does not disappear by combustion in the tissues, because the intake of oxygen and output of carbon dioxide after an initial rise actually fall after a dose of insulin. These points have not yet been satisfactorily explained. It appears certain that insulin does not act in the blood stream but in the tissues. No reduction of blood sugar occurs by treatment of blood with insulin *in vitro*. The reduction must therefore be caused by more glucose passing to the tissues from the blood, but the reason why this should be so is not, at present, known. We have, then, the apparent contradiction that insulin produces

an increase of glycogen in diabetic subjects and a decrease in normal subjects. This does not seem so paradoxical when we consider that the function of glycogen is probably as a reserve of glucose. This reserve is reduced in diabetes because it cannot be formed from glucose, and insulin brings matters back to normal and the reserve is again built up. When insulin reduces the blood sugar of the normal subject, however, the store of glycogen is reduced, because it is pouring into the blood as glucose in the endeavour to keep the blood sugar at its normal concentration. The derangement of fat metabolism which occurs in diabetes is also corrected by the use of insulin; this probably occurs as a consequence of the action of insulin on the carbohydrate metabolism.

The Therapeutic Effect of Insulin

So far as medical experience goes at present the insulin given to a diabetic patient brings the diabetic to a normal condition by acting as a substitute for the individual's deficient insulin. It does not cure the disease, although in some cases careful control of the dosage may bring about an improvement in the patient's power of making his own insulin by resting the insulin-producing cells, with the result that the dose of insulin may be gradually reduced. The administration of insulin must, therefore, be long continued, and combined with careful control of the diet, and with frequent blood sugar determinations. An overdose of insulin brings on distressing symptoms culminating in convulsions and collapse, but these may be readily remedied by a dose of glucose or barley sugar.

Insulin is now manufactured in this country in sufficient amount to supply the demand, this result being achieved in spite of many difficulties within a few months of the manufacturers being approached by the Medical Research Council with a view to large scale manufacture in this country.

The Valuation of Glues and Gelatines

By S. N. Brown, F.C.S.

Owing to the numerous methods of testing glues and gelatines, the commercial valuation of these products becomes exceedingly difficult, owing to the different methods employed by various manufacturers and to the lack of a suitable standard instrument. Commercial glues and gelatines are by no means definite substances and simple tests for purity are not available. In the following article the author outlines some of the modern methods that have been proved satisfactory.

THE gelatine content of glue or gelatine, and also the joint strength of a glue, can be indicated by a melting point determination, but these are not proportional in all cases to the jelly consistency or to the viscosity at 60° C. An indirect determination of the difference between various glues and gelatines in order of their melting points can be obtained by a measurement of the viscosity of an 18 per cent. solution (dry basis) at 35° C. by means of the MacMichael viscosimeter. This is recommended as the basis for the evaluation of these products (R. H. Bogue, Mellon Institute of Industrial Research, Pittsburgh, Pennsylvania). Tests of jelly consistency and viscosity at 60° C. are of value in secondary evaluation, in estimating the value of the sample for a given service. In the case of other special tests which are found to be necessary, a uniform method of expressing results should be adopted. Modern investigation has shown that many physical data bearing a direct relationship to each other, and which have hitherto been discarded, should be incorporated into the scheme of primary evaluation. It is well known that gelatine is a pure protein and that glue is a mixture of gelatine with the products of gelatine hydrolysis and other impurities. Commercial glues and gelatines should, therefore, from a chemical standpoint, be valued according to the proportion of pure unhydrolysed gelatine present. The majority of users of glues use these products primarily as adhesives. From their point of view the glues should be valued according to their "jointing strength" produced under the most favourable conditions. These two points of view have been proved to be identical, *i.e.*, the strength of the joint depends upon the proportion of unhydrolysed gelatine present. Extensive tests have been carried out by R. H. Bogue, giving the relations which the jelly strength, the viscosity, and the melting point bear both to the gelatine content and to the joint strength. The data obtained show clearly that if the viscosity be held constant, the gelatine content and joint strength will vary as the jelly consistency, while if the latter be held constant these properties will vary as the viscosity. But the jelly consistency and viscosity are also shown to bear the same relation to the melting point, while the latter appears to give accurately the joint strength and gelatine content.

The melting point method or some similar method seems to afford a satisfactory method of evaluation.

Although in most glues the viscosity and jelly consistency bear a definite relation to each other—*i.e.*, a certain viscosity implies a definite jelly consistency—there are many exceptions to this rule, and the determination of either the jelly strength or viscosity alone would lead to incorrect grading of the samples.

The determination of the melting point of glues and gelatines is a very difficult process and most of the methods in use are inexact. Bogue's method consists in plotting the curve of the viscosity at regularly decreasing temperatures, and extrapolating to the temperature where the viscous flow would be nil.

He further found that the same order of differentiation of the glues was obtained by merely taking the viscosity readings at a low temperature (32° C.–35° C.). This order was in most cases the same as the order of viscosity at 60° C. and the order of jelly consistency at 15° C., but in all of those glues in which the viscosity was abnormal to the jelly consistency, or *vice versa*, the viscosity at 32–35° C. was found to give a value intermediate between those two properties and also to correspond with the true melting point, and lastly to give a true value of the joint strength and the gelatine content, which was not true of any other test.

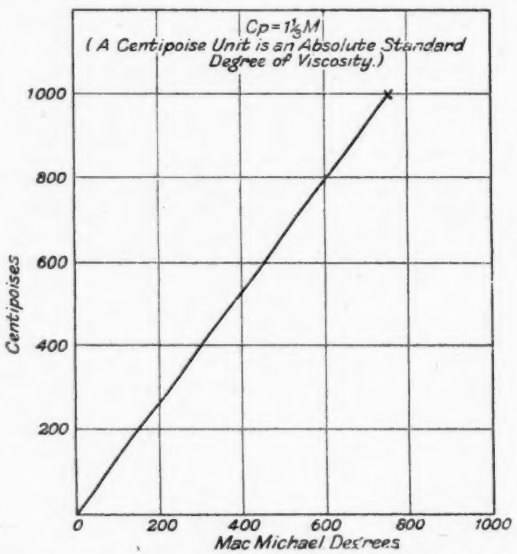

TABLE I.—Graph of MacMichael Viscosimeter with Castor Oil (Bureau of Standards Bul. 112). Wire E., Revolutions 69 per min

The MacMichael viscosimeter has been found to be the most satisfactory for the determination of low temperature viscosities. (See Table I.)

Different grades of glues and gelatines vary in water content from 10–17 per cent., the higher grades retaining the most water. It is of importance to know the ability of a sample of glue or gelatine to absorb or lose water according to atmospheric conditions during storage.

Glues have been found to vary in water content from 9–18 per cent. from this cause alone.

For a satisfactory viscosity test it would be necessary to make a moisture estimation before the viscosity test in order to eliminate this uncertain variable. It is suggested that the amount of glue to be used for the viscosity test should be equivalent to 18 grams of dry glue made up to 100 cc. in solution with water, the temperature for the test to be carried out to be 35° C. Although for *primary* evaluation the tests for jelly strength and viscosity at 60° C. may be discarded, for purposes of determining the adaptibility of a glue for a certain purpose they are still of great value. For example, the rapidity of setting and viscosity at working temperatures would be useful data for the furniture trades, and the jelly consistency would be desirable for selecting glues for printers' rollers.

Another test which recent investigation has shown to be of considerable importance in determining the properties of a glue or gelatine is the H-ion concentration. (See J. Loeb, J. Gen. Physiol., 1 (1918–1919), 3 (1920–21); R. H. Bogue, J. Am. Chem. Soc., 43 (1921), 1,764.)

A pH value of 4·7 denotes a product, nearly insoluble, and which gives a low viscosity, swelling, etc. On either side of this point a considerable increase in these properties occurs, reaching a maximum on the acid side at pH=3·5, and on the alkaline side at pH=9·0. Increasing the acidity or alkalinity above these points, a decrease in these properties is observed.

The pH value therefore is an indication not only of the reaction of the glue or gelatine, and the degree of acidity or alkalinity, but also the proximity of the substance to the points of maximum or minimum properties.

Electrometric or colorimetric means are used for the determination.

One per cent. solutions are found to be more satisfactory in either case, and the results expressed to the nearest tenth in terms of pH.

Uniform methods for the estimation of secondary properties of the samples should also receive attention.

The jelly consistency or jelly strength test is most conveniently made by the instrument described by the Forest Products Laboratory (Forest Products Lab. Tech. Notes, F 32, 1919), and expressed in millimeters of depression. For more exact tests—*e.g.*, in the selection of gelatine for photographic use—Shephard's method is more advantageous. (See S. E. Shephard, J. Ind. Eng. Chem., 9 (1917), 523). The viscosity at working temperatures, *i.e.*, 60° C., can be made with the MacMichael viscosimeter upon an 18 per cent. solution (dry basis) and the results expressed in centipoises.

The foam test may be made with the same solution in a standard glass, by means of an egg-beater turned at a definite velocity of about 4 revolutions per second for 30 seconds, and the measurement after 10 seconds taken as millimetres of foam.

The grease test may be made satisfactorily by mixing it with preferably the colour to be used, and making a streak of the glue on a sheet of paper.

The appearance, form, colour, etc., should be noted. The form of the sample should be specified as flake, sheet, ribbon, oil or ground. The degree of clarity and colour are usually stated as light, clear, medium, amber, etc., or by numerical graduations, such as No. 1, No. 2, etc. The Eastman Kodak Co. have an elaborate apparatus for obtaining exact colour data. The odour should be noted in the warm solution, and a strong or sour odour should not develop in good glues, within 48 hours, at 30-40° C. Special tests are sometimes made. In the case of gelatine for edible purposes, copper, zinc, and arsenic and sulphur dioxide have to be determined, and in some cases qualitative tests for preservatives are necessary. The estimation of the ash, precipitation with aluminium salts, etc., are other tests that are necessary in certain samples. Most of these tests are the official methods published by the Association of Official Agricultural Chemists, " Methods of Analysis," 2nd edition, 1920, 147.

Edible Gelatine and Glue

These two products can be distinguished from each other by a number of special tests.

The material is examined for copper, zinc, and arsenic, the maximum permissible in edible gelatine being 30 parts copper, 100 parts zinc, and 1·4 parts arsenic per million parts respectively.

The total ash is determined, glue being usually higher in ash than gelatine (pure).

The jelly consistency is noted, glue generally giving a lower consistency than gelatine. General appearance, colour and odour are then noted, and sulphur dioxide is sometimes determined.

Grading

The grading of glues and gelatines according to the primary evaluation may be expressed in consecutive numbers, 1 being the lowest, followed by the initial or name of the type of product—*e.g.*, Hide glue No. 1 would be designated H1, and Bone glue No. 2 would become B2, and so on, according to their graduations of viscosity measured in centipoises, the solutions used being 18 per cent. solutions (dry basis) at 35° C. H1 or B1 would correspond to a viscosity of 0–20 centipoises. H2 or B2 would indicate 20–29 centipoises as viscosity. The method of graduation is shown in the following table.

TABLE II.—Designation of Grade.

Designation.	Viscosity of 18% Solution (Dry Basis) at 35° C. in Centipoises.
H1 or B1	Below 20
H2 or B2	20– 29
H3 or B3	30– 39
H4 or B4	40– 49
H5 or B5	50– 59
H6 or B6	60– 69
H7 or B7	70– 79
H8 or B8	80– 89
H9 or B9	90– 99
H10 or B10	100–109
H11 or B11	110–119
H12 or B12	120–129
H13 or B13	130–139
H14 or B14	140–149
H15 or B15	150–159

TABLE III.—Glue and Gelatine Test Sheet.

Physical Tests.

Designation		Viscosity in Centipoises at 35° C. 18% Solution	pH 1% Solution	Jelly consistency mm. depression 10° C. 18% Solution	Foam in mm. 18% Solution	Grease	Appearance	Odour
No.	Grade							
1	H7	72	5·7	4·2	14	—	Dark flake	Sweet
2	H4	46	6·9	8·1	28	—	Brown flake	Sour
3	B9	90	3·7	4·1	—	—	No. 1 Sheet	Sweet
4	B1	17	4·9	Liquid	8	Trace	Frayed flake	Strong

Chemical Tests.

No.	Grade	Moisture %	Ash %	Copper	Zinc	Arsenic	Sulphur Dioxide	Remarks
1	H7	12·7	—	—	—	—	—	—
2	H4	11·0	—	—	—	—	—	—
3	B9	14·2	—	—	—	—	—	No ppt. with alum
4	B1	10·4	—	—	—	—	Traces	—

The highest grades would thus only be attained by the very pure gelatines, whilst the lowest grade would be given by the poor material.

The advantages of the proposed system are apparent. In the old methods, where jelly consistency is taken as a basis for determining grade, a set of "standard" glues must be maintained. These are bound to alter in the course of time. The jelly strength taken at different temperatures does not give parallel curves, thus a glue which is weaker than the standard at 10° may be stronger at 15°. Thus the value of the glue could be erroneously determined by the purely arbitrary temperature used.

Further, the numerous and diverse instruments used for the viscosity test render it exceedingly difficult to obtain from the results the degree of absolute viscosity, or even relative viscosity to some other instrument. Of great importance, however, is the fact that jelly strength and viscosity at high temperatures do not give data which are expressive of any fundamental property. These objections are overcome by the proposed system of testing. The primary evaluation does not involve the use of "standard" glues, and the use of a standard instrument which readily permits the employment of absolute degrees enables the readings to be understood universally.

Death of Dr. J. E. Stead

THE death occurred at Redcar, on Wednesday, of Dr. John Edward Stead, the well-known metallurgical chemist, at the age of 72. Dr. Stead (who was a brother of the late Mr. W. T. Stead) studied analytical chemistry under Mr. John Pattinson, of Manchester, and on the completion of his apprenticeship was appointed works chemist at Hebburn-on-Tyne. His appointment with Bolckow, Vaughan, and Co., Ltd., first at Manchester and then at Middlesbrough, gave him the opportunity of becoming thoroughly acquainted with the manufacture of iron and steel, and kindred products, and the iron and steel trade of Middlesbrough owes an immense debt to his self-sacrificing labours. At 25 years of age Mr. Stead entered into partnership with his first employer, and when Mr. Pattinson retired in 1905, he took Mr. H. Frankland, F.I.C., into partnership with him. His business career was very successful, and his high standing as a chemist and metallurgist drew to his laboratory pupils who now hold responsible positions in the British iron and steel industry. Metallographic research attracted his attention in 1893, and the results proved of value in many cases to the industry.

Dr. Stead was a Fellow of the Royal Society and of the Institute of Chemistry, and held honorary degrees in science conferred on him by the Universities of Leeds, Sheffield, and Manchester. He was president of the Cleveland Institution of Engineers in 1895, received the Bessemer Medal of the Iron and Steel Institution in 1901, and was elected president of the Iron and Steel Institute in 1920.

A New Technical School Laboratory

SIR ROBERT HADFIELD formally opened on Wednesday the new laboratory and lecture room in the chemistry department of the Birmingham Municipal Technical School. The chemical department, of which Dr. F. Newton Friend is the head, though fairly well provided for, still needs a good deal of attention, since the main laboratory requires a complete overhaul. The recognition of the usefulness of the work of the Chemical School is shown in the fact that a number of industrial firms of Birmingham and the district have made contributions towards equipping two new rooms. One is principally equipped for Corrosion Research; and the other is a lecture room with department library and museum. The funds have come from various quarters in donations ranging from a few pounds, to a most generous contribution of £150 in three yearly instalments of £50 each year by Messrs. Phillip Harris and Co. Another important donation of £142 16s. was given by the Midland Varnish, Paint and Colour Manufacturers' Association. Other donations included £50 from the Dunlop Co.; £50 from Mitchell and Butler; £25 from Chance and Hunt; and smaller sums amounting to 7 guineas. The total of these contributions exceeds £425. The Chemical Department has received additional help in the form of Research prizes offered by Sir Robert Hadfield, the Dunlop Rubber Co., the Mond Nickel Co., and the Pharmaceutical Associations of Birmingham and Staffordshire.

Safeguarding of Industries Act

Merchants and the Valuation of Imports

A CONFIDENTIAL circular, dated October 20, was issued to members of the British Chemical and Dyestuff Traders' Association, advising them that, in all cases, where they consider the value stated on an importer's invoice to be below the fair market price (although they accept such invoices as being perfectly genuine, and as specifying the actual purchase price), Customs intend to ignore such invoices and assess the goods at what, in their opinion, is the fair market price here at the date the goods are landed.

On Monday Customs received a deputation from the Association, headed by the acting chairman (Mr. F. T. T. Reynolds). Customs acknowledged that a general order had been issued instructing their officers to query cases where goods are invoiced at values which appear to be below the current fair market price for such goods in bond. They stated that recently there had been reason to suspect the genuineness of invoices in isolated cases and that the wide margin in invoice prices for similar goods had been noticeable of late. They also considered that they had the power under the Act to ignore invoices, even where they accepted them as genuine, and assess the value of the goods at a higher rate. Their intention was to appoint an impartial person (probably an official of the Board of Trade) to fix the fair value in each case.

The Association's Reply

In reply to this policy the Association pointed out that in isolated cases where Customs have good reason to suspect invoices as not being genuine the Association would gladly render every assistance to bring the matter home to the offender. In the interests of the firms represented by the Association they would be pleased to assist Customs in obtaining the conviction of any firm or firms who, by tendering false invoices, were able to undersell firms of repute disclosing actual values by tendering genuine invoices. As regards the large majority of cases where Customs did not doubt the integrity of the importer or suspect his invoice as showing a lower value than was actually paid for the goods, it was submitted that Customs were exceeding the powers given them under the Act if they demanded duty on any value other than that stated on such invoice. Briefly, and in accordance with their own precedents, Customs were only entitled to demand duty on the c.i.f. invoice value. It was obviously unfair and unjust to penalise all importers because of a suspicion that a few were guilty of irregularities.

It was further pointed out that the question of importation of cheap goods could only be dealt with under a Government Order under Part II of the Act (Dumping and Depreciated Currencies), and that until such an Order had been obtained in respect of goods scheduled under Part I of the Act, Customs were not entitled to put it into operation. The position of uncertainty in which importers and their customers were placed by this new ruling was emphasised. It was claimed that unless importers could calculate their selling price before placing orders abroad they could not do business. Importers must know definitely the amount of duty goods would be liable to before bringing them in.

During the meeting, which lasted over two hours, many illustrations were given of the difficulties that would arise. For instance, if an importer made a contract at a favourable time for regular deliveries over a long period, thereby getting his goods at an advantageous price, it was submitted that duty could only fairly be levied on the c.i.f. price actually paid by the importer, even if the market had in the meantime advanced.

Since the interview the Association have submitted the following question and have asked for a definite answer without delay:—"Whether Customs intend to continue this new practice of ignoring invoice values, even where they accept the documents as being genuine and specifying the actual c.i.f. purchase price, and assessing the goods for the purpose of fixing the amount of duty payable at such higher value as they may hold to be the current market price." The Association add that until this question is settled members have no option, if they want to obtain delivery of their goods, but to pay the duty on the higher values at which their goods may be assessed, but they should do so under protest and advise the Association, giving full particulars of the case.

Progress of Chemical Science

What British Chemists Have Done in the Past Thirty Years

On Tuesday, Dr. Herbert Levinstein paid a visit to London to discuss with the editors of a number of trade and technical journals at the offices of the Association of British Chemical Manufacturers the scope and arrangements of the Science Section of the British Empire Exhibition, of which he is chairman.

A Defence of British Chemistry

In the course of an informal statement Dr. Levinstein said that at the British Empire Exhibition at Wembley the national life of this country and of the newer nations overseas will reveal itself in every branch of its activities. In every art, craft, and manufacture, as well as in agriculture, they hoped to make a memorable display. Clearly, they could not neglect to make an exhibition of our progress and present position in science, more particularly in chemical science which was imperceptible to most, but nevertheless clearly intertwined with our progress and position in industry, with the preservation of our health, and with our enjoyment of such amenities as civilisation had provided. People were so familiar with the idea that we were behind other nations in chemistry, particularly behind Germany—he was not talking about the application of chemistry, but the study of chemistry and research in chemistry at our universities—that the thought might arise—was it wise to make such an exhibit? Would it not be better, as chemistry was so fundamental, as our progress in industry depended so much upon our progress in pure chemistry, to conceal our position in this science—at least for a time—from the prying gaze of the world that would visit Wembley? The answer was that the pure chemistry exhibit was being organised by a committee composed of representatives of the Association of British Chemical Manufacturers, of the Chemical Society, of the Society of Chemical Industry, of the Institute of Chemistry, of the Society of Dyers and Colourists, of the Federal Council of Pure and Applied Chemistry—in fact, of all relevant scientific societies, supported and greatly assisted by the advice and co-operation of the Royal Society. It would appear, therefore, that in the minds of those qualified to express an opinion it would redound to the national advantage in every way for the world to see what British men of science had done and were doing to build up the science of chemistry as it is known in the world to-day. They might put it higher. The pure chemistry exhibit at Wembley would, without a doubt, for ever destroy the illusion, which had had some justification in the past, that our university training and research in chemistry was below the highest standards of other countries.

Thirty Years Ago and Now

This, Dr. Levinstein said, would not have been true in the same sense thirty years ago. We had always had masters, giants of science. In a sense the exceptional man of genius and science belonged to the world. In the richness and the output of the many workers of talent, in the vigour of the teaching at the many universities, in the output of first class work in every branch of chemical science, they would find the true criterion of the national position in chemical science. Thirty years ago we could not have shown this. The development of our chemical schools as known to-day was comparatively new and was as yet not appreciated by the general public. They would, of course, appreciate immediately that it was of great importance to the chemical industry for the world to know that behind it were great schools of chemistry, directed by great teachers of chemistry, and inspired by great original workers in chemistry who could supply ideas and well-trained students to fertilise the chemical factories — otherwise arid wastes of pipes and tubs and vats and buildings. It was also of importance to our university laboratories that their work and influence should be more widely known to the public who supported them. Perhaps, however, it had not occurred to everybody what an enormous advantage it was to the public to see with its own eyes and to be able to comprehend by the most charmingly delightful examples, things which were a few years ago entirely matters of metaphysical speculation. To quicken the imagination of our people, to give them some idea of the enormous interest —of which they were for the most part entirely unaware— of the simple things which surrounded their daily life was one object of this exhibit. Nothing could be of greater importance than to give the general public through the eye and in an interesting way greater appreciation of the value of chemical science in the affairs of life, and of the steps that preceded great industrial or medicinal discoveries.

The Scope of the Science Section

It was satisfactory to know, he added, that they had the leading minds in chemical science and industry working cordially together, without opposition or rivalry, to produce a thoroughly representative show. The proposal to hold a pure chemistry exhibit arose from a desire among British chemical manufacturers to show, not only the great things done during and since the war, but the great advances in chemical science and the developments in chemical research and teaching during the past thirty years. They proposed to show the growth of the teaching facilities, the volume, quality, and results of the research work, and the advances made in the whole field of organic chemistry especially. In considering the arrangements for the chemical exhibit they would meet at once with two surprises. The first was the comparatively recent date at which all this volume of work started. The research work of which he spoke did not go back much beyond thirty years, and their object would be to show what had been accomplished in a form that the public could understand. The second surprise would be the extraordinarily comprehensive character of chemistry and its applications in industry. It was really impossible to say where it began and where it ended, and numbers of discoveries, which seemed at the time to be of a purely academic character, had proved to be of immediate value in industry —such discoveries, for example, as those of rare gases like argon and helium.

List of Conveners

An interesting discussion took place on the scope of the science section, and the following particulars as to various sub-sections, with the conveners in charge, were given :—

Structure of the atom.—Sir Ernest Rutherford.
Spectroscopy,—Professor J. C. McLennan.
Crystallography and crystal structure.—Sir Henry Miers.
Valency theories and theories of chemical combination.—Dr. Arthur Lapworth.
Photography.—Dr. T. Slater Price.
General physical chemistry.—Professor F. G. Donnan.
Atomic weight determination.—Dr. Alexander Scott.
Analysis: Hydrogen ion concentration.—Mr. A. Chaston Chapman.
General inorganic chemistry.—Professor E. C. C. Baly.
Flame, fuel and explosive waves.—Professor A. Smithells.
Organic chemistry.—Dr. Henry and Professor F. L. Pyman.
Biochemistry.—Mr. J. L. Baker.
Agricultural chemistry.—Sir John Russell.
Sugars.—Principal J. C. Irvine.
Terpenes.—Professor G. G. Henderson.
Plant colouring matters.—Professor I. M. Heilbron.
Coal tar colouring matters.—Dr. J. T. Hewitt.
General organic chemistry.—Professor J. F. Thorpe.
Cellulose.—Mr. C. F. Cross.
Catalysis.—Mr. E. F. Armstrong.
Explosives.—Mr. W. F. Reid.
Plastics.—Dr. W. R. Ormandy.
Apparatus.—Commander R. E. Stokes-Rees, R.N.
Chemical engineering.—Professor J. W. Hinchley.
Historical.—Mr. R. B. Pilcher.

In each case the object will be to indicate the present state of scientific knowledge, and it is intended to publish a volume embodying this information. The historical section will take the form of a small museum, and already many interesting exhibits are promised.

Slight Decrease in Unemployment

The number of persons on October 22, 1923, recorded on the live registers of the Employment Exchanges in Great Britain was 1,249,500. This was 4,642 less than in the preceding week and 236,378 less than the figure recorded on January 1, 1923. The total included 940,900 men, 41,500 boys, 229,600 women, and 37,500 girls.

The British Association of Chemists

Annual Meeting at Birmingham

THE British Association of Chemists held on Saturday at the Chemical Department of the University of Birmingham, under the chairmanship of the President (Dr. H. Levinstein), their sixth annual general meeting. Delegates were present from various parts of the country.

Income Exceeds Expenditure

Mr. H. E. J. Cory moved the adoption of the statement o accounts, and in doing so said it gave him satisfaction that for the first time in four years their income on the general account has exceeded their expenditure. The present income was insufficient to meet the needs of the Association, having regard both to the cost of covering adequately and completely the whole field of the B.A.C. activities, and to the attendant costs of administration, which at present absorbed approximately 60 per cent. of available income.

The ordinary subscription remained at one guinea, as after consultation with the local section committees, the Council was of the opinion that any increase was inadvisable and would defeat the desired ends. An improvement in their financial position could come only through an extension in membership, and by this means alone could they increase income. The financial state of the Unemployment Benefit Fund was satisfactory, and in spite of large calls a substantial balance remained. He recommended that the actual creation of the special reserve fund be undertaken at an early date, and estimated that at least £100 per annum would be available for this purpose at the present rate of working. He acknowledged the help of Mr. A. S. Mills, assistant secretary.

The President said it was satisfactory to find that in a critical year, in spite of the depressed state of the chemical industry with attendant unemployment, their accounts showed an excess of income over expenditure. This reflected credit upon those responsible for supervising the finances. The basis of their success, and of their activities which were not covered by any other body, depended upon a sound financial status.

The resolution was seconded by Mr. E. F. Morris (Manchester) and carried.

Need of Increased Funds and Membership

Mr. W. E. Kay, in moving the adoption of the report (published in THE CHEMICAL AGE of October 20), said that a real effort was essential to increase membership. He hoped the Association would become absolutely representative in bulk membership of the chemists of the country, but frankly they had to admit they were as yet a long way off that position. To carry out their aims adequate funds and a large membership were necessary, and there was no matter to which the members could more usefully devote themselves than that of making known the objects of the Association. With a sufficient body of members they would be able without difficulty to achieve the work they were out to do. In the Unemployment Benefit Fund the economic aspect of the Association had been brought to the forefront. The Council, without actuarial experience, made the experiment, and the result so far was satisfactory. It was unfortunate that the Associations should be divided, because they tried to act in concert with chemical and other scientific bodies having objects somewhat similar to their own. His sincere hope was that further progress might be made in this direction. The Legal Aid Fund was doing quiet, useful work. With regard to income tax much work had been done concerning the question of abatements. The Council had also paid close attention to questions of industrial and Parliamentary interest, and had interposed where the interests of chemists were concerned, or were likely to be concerned, or neglected. As to education it must be recognised that if they were to maintain a high standard in chemistry they must have a wide choice so as to get the best material; this was the only way by which the scientific reputation of our country could be maintained. Mr. Kay added that he had always felt that their actual line of association was with the Institute, and he clearly indicated this in the early days of the Association. In conclusion, he expressed on behalf of the Council warm appreciation of the excellent services long rendered by their late secretary, Mr. Price, and also by Mr. Brightman, the editor of their journal.

Mr. E. R. Redgrove, in seconding, said that the only way to make real progress was to get an increased membership. They needed the co-operation of all chemists.

Dr. J. L. Hankey pointed out that the Council were most anxious to meet criticism. He welcomed it because it was a stimulant. There was need for a strengthening of the financial position, particularly having regard to the question of unemployment. Their one great ideal was to raise the status of the professional chemist, and their efforts were directed to that end; they desired he should occupy that place in public opinion to which he was entitled. It had been said by a man holding a high position in the industrial world that it was not the chemist that counted at the present moment so much as the business man. They did not believe that to be the case. The only way the chemical industry could flourish was by the harmonious working of two sets of minds. The Association was badly in need of propaganda but this could not be done until more money was forthcoming.

The President's Views

The President observed that the question had been asked what were they to tell the chemists when they invited them to join the B.A.C. It appeared to him that the Association was primarily a movement which came up "from below." It was something different from the other organisations, for its outlooks and its functions were different. It was not a high-brow movement, and was not got up by professors and others who had hitherto spoken for the chemical profession. This was important, particularly from the point of view of new members. Their object was to get together all fellows who were engaged in factories and in chemistry generally, the Association being run by persons similar to themselves. In a corporate way it could help them in all kinds of difficulties that might arise; neither the Institute of Chemistry nor the Society of Chemical Industry could do this. The report itself showed that the Association was able to do that which could not be done by any other organisation, and in this connection he referred specially to the Unemployment Fund and the Legal Aid Fund; there were, in fact, few things that concerned the works chemist in which assistance could not be rendered by the B.A.C. Public spirit was necessary. But at the same time, having regard to the circumstances of the time, there were few men in the industry who were so sure of their position—and there was too the possibility of a breakdown in health—that they could afford lightly to ignore the provision offered by the B.A.C. He emphasised this from the point of view of the works chemist. With regard to the Institute he agreed with the general sense of the meeting that their proper line was to work with the Institute; to do that effectively they must make themselves as strong as possible. The question whether chemical undertakings should be directed by chemists or by business men was not so important as that business undertakings should be directed by people who understood their business. The man who understood his business was a man for whom chemists could work.

Election of Officers

The following were elected officers for the ensuing year: President, Dr. Herbert Levinstein; vice-presidents, Mr. W. E. Kay and Mr. Fred Scholefield; hon. treasurer, Mr. Harold E. J. Cory; hon. general secretary, Mr. I. Boodson; hon. registrar, Dr. David Bain; and hon. editor, Mr. A. Merrick. Messrs. Hughes and Allen were re-elected auditors.

The members later, at the invitation of the Chemical Department at the University, inspected an exhibition of specimens and apparatus from the Research Section. A small-scale plant and appliances were shown in operation. The appliances included autoclaves, made from discarded war shells. In an adjunct, recently built over an area, are installed high temperature furnaces.

The Annual Dinner

The annual dinner of the Association was held in the evening at the Queen's Hotel. The President (Dr. H. Levinstein) presided, and supporting him were Professor Morgan (Birmingham), Dr. E. B. Maxted (chairman of the Birmingham and Midland Section of the Society of Chemical Industry), Dr. Sumpner (head of the Birmingham Municipal Technical School), Dr. Newton Friend (Chemical Department of the Birmingham Technical School), and Major A. G. Church (National Union of Scientific Workers).

A letter was read from Mr. Grant Robertson (the principal of the University) expressing regret at his absence. He pointed out that the University had a most important Department of Chemistry, with a fully-equipped Research Department, in which a large number of research students, under Professor Morgan, were engaged on important work. The relationship of the B.A.C. with the University authorities was of increasing importance. (Hear, hear.) The President said that those who visited the University, and inspected the laboratories, where a great work was being done under Professor Morgan, would appreciate the compliment that Principal Grant Robertson had paid to the Association.

More Scope for Chemists

In proposing the "B.A.C." the President in a racy speech observed that if new industries were developed and a bid made to secure the world's markets there would be an opening for chemists which hitherto did not exist. We must not confine ourselves to the home market. If we could secure the home market and a share of the world's markets, then the great work which was being done at universities would find its due reward in the important positions that would be offered to chemists. The B.A.C. had a great opportunity, with definite functions not possessed by the Institute, and his sincere wish was that the Association should flourish.

Mr. W. E. Kay, in replying, pointed out that the Association was young and had independence and freedom. They had the courage to make experiments; their constitution gave wide powers, and they wanted to exercise them in any way they could for the benefit of the profession. The message to his fellow members was—try and increase the numerical strength of the Association.

Unity Among Societies

Mr. E. R. Redgrove submitted the toast "Kindred Societies." The Society of Chemical Industry came nearer, he said, to the class of chemists they represented than any other; and it did splendid work in letting them know what was happening. The Chemical Society, which was the more academic, also helped them considerably. The Institute of Chemistry, with which he hoped they would always be friends, had definite functions which were entirely separate from theirs.

Dr. Maxted, in responding, remarked that many present were members of the Society of Chemical Industry. Chemical Societies were in two groups: to further chemistry, and to further the chemist. He was conscious of the good work that was being done by the B.A.C. Whatever might be the aim or object of a society to which they belonged they all felt the ties of friendship and of interdependence of one society on the other. It was only by a unity among societies that chemistry could be put in a proper position in this country. They should not lose sight of the fact, however, that the real place of chemistry and of chemists was determined not by societies but by the standard of chemistry; they should not lose sight either of the importance of pure chemistry in furthering chemistry. (Hear, hear.)

Research in the Universities

Dr. Kay proposed "The Universities and Seats of Learning," and coupled with it the names of Professor Morgan and Dr. Friend. They had a vivid recollection of the broad-mindedness of Dr. Morgan when discussing, many years ago, matters connected with the B.A.C. and the Institute. What impressed him was the strong plea he then made for unity in the profession. He believed his plea for unity was gradually being realised. Unless they could speak for the profession as a whole their progress would be slow. As a society they looked to the universities to perform the function of maintaining the supply of highly trained chemists. Upon the English universities would devolve, he believed in increasing degree, the maintenance of the torch of modern research. The conditions abroad were worsening. This fact placed upon the English universities the onus of maintaining a high outlook and producing highly-trained chemists. The future efficiency of the chemical industry, and, in the long run, the welfare of the nation, would depend upon the highest possible supply of highly-trained chemists and physicists. More might be done by getting in touch with the student before he graduated. This was a method of propaganda which would bring members to their roll.

Bottle-washers to German Professors

Professor Morgan, in replying, said that before the war it was the usual thing in most of the universities for two or three students taking honours and desiring more experience for research to go abroad. The professors of chemistry were bottle-washers to the German professors; it was a matter for satisfaction that the whole outlook had changed. Their success as an association was bound up with theirs at the universities. If they could not maintain the avenue to the chemical profession, if the chemical industries dwindled, then the chemical schools would disappear to some extent. That was why it was so important that an association of that kind should do its best to maintain the dignity of the chemical profession. It was all to the good that they had an active association of this kind bringing before the public the necessity of the employment of chemists. He had seen many instances in works where chemists could be employed to the pecuniary advantage of the concerns, and yet they were without chemists or employed them in small numbers. They must insist upon the employment of chemists in far greater numbers than at the present time. His hope was that year by year the B.A.C. would meet in one of the Universities, and would thus come into closer communion with the young chemists who were receiving their training there.

Dr. Newton Friend also replied.

Mr. N. P. Booth (Birmingham), proposing the toast of "The Guests," said that despite the fact that they were a trade union he did not think anyone in the B.A.C. was ashamed. It supplied the open door by which to do things for chemists which they knew the Institute was unable to perform.

The Observer's Point of View

Dr. Stephen Miall, whose name was coupled with the toast, mentioned that he was probably the only one present who was not a chemist; that enabled him to view the various chemical societies in a broad manner unbiassed by detailed knowledge of their work and activities. He had been trained in the profession of the law, and it was of great interest to notice the extraordinary difference between the organisation of lawyers and the organisation of chemists. To become a chemist was at least as difficult and involved as much prolonged study, probably more, as was necessary to become a lawyer. Yet the chemists seemed to make less impression upon the great body of the public, including the manufacturers of the country, than did the lawyers. They needed to develop the community thought that existed among barristers and solicitors. Thus he hoped through these professional organisations a way would be found, in the course of the next few years, of bringing all chemists closer together in their aspirations and traditions, and in their outlook upon life, so that manufacturers, statesmen, politicians and all others who were concerned with the development of our national prosperity would find that the chemists were a body whose advice was to be listened to with respect and whose influence could be made to be felt, and that the community at large would recognise the importance of the services the chemist was rendering to the public.

The toast of the "President," proposed by Mr. E. F. Morris, concluded the proceedings.

Sulphate of Ammonia Price Scheme

Federation's Action Against South Metropolitan Gas Co.

On Wednesday, in the King's Bench Division, Mr. Justice Greer commenced the hearing of the action by the British Sulphate of Ammonia Federation, Ltd., against the South Metropolitan Gas Co., which related to the proper method of keeping accounts in a pooling system and of equalisation price system adopted as a consequence of the war.—Mr. R. A. Wright, K.C., Mr. Jowett, K.C., and Mr. Le Quesne appeared for the Federation, and Sir John Simon, K.C., Mr. Raeburn, K.C., and Mr. Wyllie for the Gas Company.

The Federation asked for a declaration that certain proceeds of sales of sulphate of ammonia for British agricultural use under an equalisation scheme of 1920-1921 were due to the plaintiffs. Defendants denied liability.

Mr. Wright, in opening, said that when the case was mentioned last week it had been hoped that the Court would not be troubled, but that course had been found to be impossible. The action was to ascertain on what principles accounts were to be adjusted between the parties. The disputes which had arisen between the parties had reference to a scheme called the Equalisation Scheme in operation during the years 1920-21 for the equalisation of prices of sulphate of ammonia. The members of the Scheme were the makers of the commodity in this country. It was a chemical manure, largely used in this country for agricultural purposes, and during the war was used for the manufacture of munitions and explosives. During the war the Government controlled its manufacture with two main objects, one being to secure the supply for munition factories and the other to ensure a fresh supply for the agricultural needs of the country. There was also the question of export, which during some of the war years was prohibited or only permitted by licence. Towards the close of the war and after the Armistice difficulties arose in regard to both the home trade and the export trade in this commodity which was a by-product of gasworks and blast or smelting furnaces. There was a necessity for economising transport and for securing home trade. There had been an organisation in the trade previously, but in 1920 the Federation was formed as a limited liability company, and carried out a scheme of equalisation. They had about 90 per cent. of the makers in it, and the defendant gas company represented about five per cent. of the total output. The position of the maker was affected by his topographical position, and the Federation arranged for the distribution of the orders amongst the makers, both for home and export trade, and the surpluses arising from the profits were distributed to the members. The Federation had ingenious schemes for regulating the trade, but towards the end of 1920 problems arose which had to be dealt with. By that time the foreign competition in the export market, which was small in the war, began to become operative again as the productive capacity of foreign countries had largely increased. Under those circumstances the question had to be considered how the equalisation was to be dealt with in a falling export market with the home trade. It was in respect of this that the difference of opinion arose with the defendants.

Mr. Wright said he should show how the agreement was worked by the Federation according to the obligations imposed upon them. Defendants said because there was a specific provision as to what was to be done with regard to export sales, that excluded from the agreement the equalisation of all sales. The home sales equalised automatically, but that was always the idea of equalisation. The whole working of these details was left to the Federation. A circular was issued which provided that non-members should be placed on the same footing as members. Dealing with the prices, counsel stated that at one time £27 per ton f.o.b. the colonies was quoted, a price "which the producers of sugar can well afford to pay."

His Lordship: Was this still above the home price?

Mr. Wright: Yes. The home price was reduced, and at that time it was £26 a ton. The circular stated that America had agreed to "keep out of Spain" if the Federation kept out of Cuba, Puerto Rico, etc.

Sir John Simon said his point in regard to the rebates quoted was that whatever rebates his clients had to make to their customers, those rebates only should be put against his clients. But what the plaintiffs had done was to debit in the surplus fund the amount which everybody got from the fund as a whole.

Mr. Wright: I am grateful to the defendants to gather that they were prepared to concede anything. It was agreed that rebates all round in the trade should be paid out of the equalisation fund.

Sir John Simon said his contribution was consistent with his pleading. The Federation had duties to perform to their members with which the gas company had nothing to do.

Mr. Wright said his point was that all these storage expenses of the product were properly incurred by the Equalisation Committee in carrying out the duties imposed upon them by the working of the scheme with which they were charged. Surely the plaintiffs were entitled to charge the expenses properly incurred in this way?

His Lordship: In what way? In what proportion?

Mr. Wright said they were dealing here with the question of a divisible surplus and nothing else. In that fund each member of the Equalisation Scheme was entitled to share *pro rata* to his production. The plaintiffs were saying that what the defendants had got was in excess of the amount that they ought to have received, because either more had been brought into the fund or some arithmetical error had been made in the matter. Defendants had nothing to do with the details of the fund, except that they complained that matters had been brought into the account which ought not to have been brought into it. The only question in this part of the case was whether the Equalisation Committee was entitled to bring into the fund certain disbursements or not. It was difficult to realise the defendants' objection to the course adopted in view of their action in the matter as disclosed by the correspondence.

His Lordship again suggested that the parties might discuss this matter with advantage.

Mr. Wright said he took the view that the matter was one of accountancy, though his Lordship could decide matters of principle.

Sir John Simon said the matter had stood over with that in view, but no decision had been arrived at. A short adjournment might be advantageous.

Mr. Wright agreed, and the further hearing was adjourned to Monday, November 12.

Arbitration on a Chemical Contract

In the Commercial Court of the King's Bench, on Wednesday, October 24, Mr. Justice Greer commenced the hearing of an action brought by Serimaglio, merchants, of Genoa, against Thornett and Fehr, of Leadenhall Street, E.C., which arose out of a tallow contract and a soda ash deal.

Mr. Jowett, for the defendants, stated that the onus was upon him, as the Court had to try a preliminary point, as plaintiffs' claim for £392, overpayment in respect of certain packages of vegetable tallow, was admitted, subject to defendants' counterclaim, which arose upon two contracts by which plaintiffs agreed to purchase from defendants 200 tons of soda ash, c.i.f. Genoa. Defendants appointed Mr. Charles Mangold as their arbitrator, and, no arbitrator having been appointed by the plaintiffs, Mr. Mangold heard the arbitration and awarded the defendants £4,800 damages against the plaintiffs. Defendants now claimed the sum. Plaintiffs' reply was a denial of the liability for repudiation, saying that the only arbitration contemplated was an arbitration in London in the usual way and under the Arbitration Act, which meant by an arbitrator appointed by the Court. It was further said by plaintiffs there was no concurrence in the appointment of Mr. Mangold, and that arbitration in the usual way in London meant arbitration according to the rules of the British Chemical Trade Association, which meant that the arbitrator was appointed in accordance with their rules. Mr. Justice McCardie had ordered the issue whether Mangold's award was valid to be tried first. The British Chemical Trade Association's system was a reasonable one, and if one side failed to appoint an arbitrator, the other side might apply to the committee to appoint an arbitrator to fill the vacancy.

Mr. Emile Fehr, a member of the defendant firm, and Mr. Mangold both gave evidence that the custom was to appoint two arbitrators and an umpire if the former disagreed.

The hearing was adjourned.

The Streatfeild Memorial Lecture

The Work of the Chemical Analyst

MR. E. M. HAWKINS, public analyst at Canterbury, who gave the Streatfeild Memorial Lecture at the Technical College, Finsbury, on Thursday, October 25, chose "Analytical Chemistry" as his subject, and made the lecture something of a talk to students as to the qualifications and possibilities in this connection. He said that, roughly speaking, analytical chemistry could be divided into three branches—viz., the consulting chemist, the public analyst or the analyst working in municipal or Government laboratories, and the chemist engaged in analytical operations in a works. It was very likely that in time these three branches would become more distinct than they were at present or had been in the past. Mr. Hawkins said he remembered reading of an American who said that if he wanted to find out whether there was any cotton-seed oil in his lard he would consult an analyst, but if he wanted to find out how to make the stuff he would consult a chemist. That sort of distinction still existed to-day, but personally he thought a chemist should be a good analyst, and an analyst should be a good chemist. There were, of course, men who had drifted into positions as analysts who by no stretch of the imagination could be called chemists, and it was for that reason he impressed upon his audience that if any of them took up analytical chemistry there was a very great need for the broadest possible training. Some students who had been very fond of chemistry looked upon physics and mathematics as sort of side-shows in which they should take no interest, but that was a great mistake, because there was very little chance in analytical chemistry to-day for anyone who neglected physics. Further, some knowledge of electrical science was necessary, and he made a special plea for the study of mathematics, because it was a great advantage in practice that a man should be able to make ordinary calculations absolutely accurately. Incidentally, the lecturer laid stress upon the importance of the examinations of the Institute of Chemistry, which, he said, aimed at testing the student's practical knowledge rather than his ability to pass examinations for which he had been crammed.

It was a further great advantage for any young man who wished to take up analytical chemistry in any form to spend at least a year in some kind of factory where foodstuffs were prepared and where a chemist was employed, in order to get some idea of the practical problems, and, perhaps, at the same time learn something which in after-life would prevent him suggesting remedies which were impracticable as a matter of works operation.

The Need for Accuracy and Rapidity

The first and foremost qualifications for success in analytical chemistry was accuracy. The results obtained must be depended upon. Nothing was worse in a young man fresh from college or after he had been in one or two situations than inaccuracy, unless it was that he did not know he was inaccurate, which was worse. There was, of course, in all analytical chemistry a very great deal of routine work to be done, which some people called soul-destroying and which very few people liked, but there were many occasions when this work was of the highest importance, and consequently it should never be done carelessly. It should always be done with some sense of responsibility. Nothing, for example, could be more tedious than examining samples of coal-dust and estimating the amount of moisture and ash, but carelessness in doing this work might easily lead to the loss of life.

Another essential was that there should be some capacity for rapid working, and probably nothing struck a young man from college who went into the works for the first time more than the manner in which he was expected to get through the work quickly. Yet another essential feature of analytical work was the faculty for clear expression in any reports that were prepared. Many a good piece of work had been spoiled because those to whom the report was addressed had never fully understood it on account of lack of clearness of expression on the part of the analyst. Again, there must be confidence on the part of the analyst in his results, and he must at all times be prepared to justify them.

Works Laboratories and Public Laboratories

Mr. Hawkins then had a word to say as to the difference in the work carried out in works laboratories and public laboratories. In the first place it should be recognised that the number of analysts employed in municipal or Government laboratories was limited. There might be more employed in the days to come, but unless there was some very great change in the aspect of public life he did not think it likely that there would be a great many more. On the other hand, there were certain branches of industry which had only just begun to appreciate the value of the chemist and realise the necessity for him, and, therefore, whilst the number of public analysts might be restricted, when the present bad state of trade had passed away there would be many more opportunities for the works analytical chemist. Perhaps this was hardly the place in which to discuss the question of whether the public analysts or the works analysts were the better paid. On the whole, he was inclined to believe that a man of ability could obtain equally good pay in either branch.

It was essential that the analytical chemist should keep up to date in his reading of the literature. He had met good men who, however, were twenty or thirty years behind the times through the fact that they had neglected their reading, and who, at a certain time of life, seemed to cease reading altogether. In his own experience he had saved himself an enormous amount of time in various operations through having kept himself up to date in his reading and knowing where to look for information upon any particular point. To the senior students, too, he urged the importance of attending every scientific meeting they possibly could.

The Consulting Chemist

In conclusion, Mr. Hawkins said that, if he viewed matters rightly, the tendency in the future would be for municipal and public analysts to be whole-time officials. The variety of work might become less, although personally he did not think it would. His own experience had been in the contrary direction. The consquence would be this, that in the future the consulting chemist would be very much separated from the public analyst and the works analyst. He could not help thinking that in the future the consulting chemist would need to be a man of the highest mental capacity and ability. Manufacturers in all branches would more and more employ works chemists to control their processes and analysts to examine the raw materials and products, and it would, of course, be that it was the problems which the chemist on the spot could not solve which would be handed over to the consulting chemist. The consulting chemist, therefore, would have to be well acquainted with all the latest developments in chemistry and the allied sciences, because he would be asked to advise on processes rather beyond the scope of the chemists employed in the particular factory. Such work should be very liberally paid for, but, as in the case of the budding barrister, there might be a difficulty in obtaining a foothold.

He hoped he had been able to make clear that the profession of analytical chemist is not a sort of hanger-on to the profession of chemistry in general, that it touched life at many points, and that it needs its own special qualifications. Although in many cases in the past it had not been adequately remunerated, it was a great branch of the profession in which, if any of those present found themselves in it, they would be able to lead a life of usefulness to their fellow-men, to be a credit to themselves, and at the same time it was not without its compensation.

Europe and the British Empire

DISCUSSING the work of the British Imperial Conference, this week's *European Commercial* states: "There are, at the present time, advocates of a completely self-contained British Empire. They would like to see a detailed system of Imperial preference set up with the ultimate object of securing the exclusive use of British products in the Dominions and vice versa. For ourselves, we look at the matter mainly from the European point of view. The British Empire cannot absorb its own output, and, as this is principally designed to appeal to purchasers on a high plane of civilisation, the markets of Europe must be taken into consideration in an ever increasing degree. Nor can the flow of goods be in one direction only, and if Europe is to purchase from Britain and the British Empire, these latter must purchase European products in return. The restoration of Europe is a concern of the most vital importance not only to Britain, but also to the Dominions."

Hydrogen Peroxide Bleaching

A Paper before the Society of Dyers and Colourists

In a lecture to the London Section of the Society of Dyers and Colourists on Thursday, October 25, Mr. I. E. Weber, B.Sc., chief chemist to B. Laporte, Ltd., of Luton and Bradford, gave a description of the properties of hydrogen peroxide and its application in bleaching.

It was about a century ago, he said, that Thenard discovered an inorganic compound, unique in its wonderful properties. Thenard was experimenting with various acids to determine their effect upon barium peroxide, and obtained a liquid which he believed was an oxidised acid. Later, Thenard showed that this liquid was oxygenated water, or "*eau oxygenee*," by which name hydrogen peroxide, made from barium peroxide, is to this day known in France. The amount of oxygen present in hydrogen peroxide was twice that in water, and it was this extra oxygen which, when liberated, had most remarkable bleaching properties.

Dealing with the manufacture of hydrogen peroxide from barium peroxide, he stated that it was a source of satisfaction that we had the necessary raw materials in this country, the barytes or heavy spar being mined in Derbyshire, Ayrshire, and other places. The mineral was reduced to barium sulphide from which barium carbonate was made. This carbonate was then reduced to barium monoxide, which again was converted into barium peroxide, which was the primary raw material for the manufacture of hydrogen peroxide.

The strength of the hydrogen peroxide usually supplied to the trade was 12 volumes strength, which meant that a given volume of peroxide would yield 12 times the same volume of oxygen. It was also pointed out that a peculiar quality of hydrogen peroxide was its stability; weak solutions are just as stable as those of higher strengths, but certain metals and salts of those metals acted as catalysts and liberated oxygen.

Advantages of Hydrogen Peroxide

Mr. Weber then dealt with the bleaching of animal fibres with hydrogen peroxide. The object of bleaching, of course, was to obtain a finished fabric free from deleterious impurities and pigment, and two processes were generally used. One was bleaching by reduction—namely, the sulphur bleach, in which sulphur dioxide was used. The sulphur stove, however, was still uncomfortable to work because of the suffocating fumes. Another objection to stoved white was lack of permanancy, whilst yet another was its effect upon colouring matters, which were readily destroyed by sulphur dioxide.

Bleaching with hydrogen peroxide, however, was a process of oxidation, and in hydrogen peroxide we had the ideal bleach, because after liberating its oxygen water remained behind. It was a process of speeding-up nature's method of bleaching by moisture and sunlight. Detailing the advantages of bleaching with hydrogen peroxide, Mr. Weber said that in addition to permanency the white was a purer white than with the SO_2 process, the fibres of the fabric did not tender; garments so treated did not smell, and the sterilising properties of the hydrogen peroxide rendered the goods "sweet" and they remained so on storing and did not mildew. Further, since practically only water was left after the bleaching process, the goods did not need the rinsing required after other bleaches.

Suitable Apparatus

Although wood could be used for the apparatus, this was not advised, as it disintegrated after prolonged action of the hydrogen peroxide upon it. Wooden tanks, however, could be given a new lease of life by pegging them and coating them with half an inch of concrete. Lead-lined vats were sometimes used, but an alkaline solution of peroxide acted on the lead, forming a lead peroxide which might scale off as dust on to the goods. Enamelled vessels, either enamelled on cast iron or steel, made excellent baths, whereas porcelain, although unacted on by the peroxide, did not stand the wear and tear of the bleaching plant, and was liable to crack. A very serviceable bleaching tank could be made of glazed and blue bricks. The glazed bricks were put on the inside of the tank and the blue bricks outside, the tank being built upon a concrete bottom. A bleaching tank of this description, if built right, would last for years and give no trouble. For heating up the bath, lead or tin coils should be used, tin resisting the action of weak peroxide solutions well and repaying the initial expense. The coil was laid across the floor of the bleaching tank and was covered with a perforated false bottom to prevent the goods coming into contact with it and being spoiled.

It was recommended that a softened water should be used. It was further emphasised that iron salts should be kept out of the water. Discussing the use of a suitable indicator, it was urged that the usual expression "It should be faintly alkaline to litmus" as a test of neutralising hydrogen peroxide, was too indefinite, and reasons were given for preferring phenol red as an indicator rather than litmus paper; the former proving to be much more sensitive, as the result of tests he had made. As regards the substance used for neutralising the bath, figures were also given pointing to the fact that one-third the cost of hydrogen peroxide used in bleaching could be saved by the use of silicate of soda as the neutralising agent. In addition, any iron which might accidentally be present in the goods, or any copper in the form of stains, would not damage the fibre in the presence of silicate of soda, which had a protective influence. Bleachers and dyers were also urged to aim at uniformity in their processes; to standardise the methods of working for a particular quality of goods; to use the weight of the goods as a basis; to use the same strength of bath and the same quantity of sodium silicate to neutralise the bath. Finally, it was recommended that the same temperature should be maintained in order to reduce the possibility of uneven shades to a minimum.

For the after treatment of sulphur dyestuffs, hydrogen peroxide was claimed to have advantages, for, when used in an alkaline solution, it promoted more rapid oxidation than was possible in the air.

A number of questions were asked after the lecture, in reply to one of which Mr. Weber stated that comparative trials had shown that with sodium peroxide it cost 33 per cent. more per lb. to bleach, with sulphuric acid and ammonia as neutralising agents, than with hydrogen peroxide, neutralised with silicate of soda.

The Industrial Chemist

The Glasgow Section of the Society of Chemical Industry held its opening meeting of the session on Friday, October 26, at the Institution of Engineers and Shipbuilders. Mr. W. E. Moodie, F.I.C., delivered an address on "The Industrial Chemist." He dealt with the function of the chemist in the factory, with his training, duties, and aim. In a large chemical works, he said, there were two laboratories—the works laboratory and the research laboratory. In the research laboratory the chemist performed his work without reference to finance, but in the works laboratory economic conditions had to be considered; analysis must be carried out with speed and accuracy, and specifications drawn up for raw materials. The chemical engineer who worked in the no-man's land between chemistry and engineering should be first a chemist and then an engineer. Materials of construction appealed greatly to the chemist, and he, rather than the engineer, should judge what material was suitable for a specific purpose; he must recognise, however, that material such as silica, which was suitable in the laboratory might be impossible on a large scale. Mr. Moodie also combated the opinion that "the chemist is not a business man."

Institute of Chemistry: Glasgow Section

The annual meeting of the Glasgow and West of Scotland Section of the Institute of Chemistry was held on Thursday, October 25. Nine new associates were formally admitted by Mr. W. Rintoul, F.I.C., who presided. A welcome was extended to Mr. G. S. W. Marlow, assistant secretary of the Institute, who referred to the Liverpool conference of chemists, at which the question of post-graduate training of those entering the chemical industries was very fully discussed, and outlined the proposed scheme of federation of the various scientific societies, including the several chemical societies. The new associates are John G. Ballingall, B.Sc.; James Hendry, B.Sc.; William Jack, B.Sc.; Charles R. Louden, B.Sc.; George Malcolm, B.Sc.; Richard Ralston, B.Sc.; Andrew P. Orr, M.A., B.Sc.; Alexander Walker, B.Sc.; George A. Wilson, B.Sc.

Chemists and Water Rights

Mr. S E. Melling, F.I.C., on Recent Decisions

In the course of a paper on "Some Aspects of Water Right Cases," read before the Manchester Section of the Institute of Chemistry on Wednesday, October 24, Mr. S. E. Melling, F.I.C., emphasised the desirability of a freer interchange of opinion and views between members of the Institute on matters relating to the practice of technical and professional chemistry, more particularly with a view to illustrating specific points and principles in reference to one's own experience. In advancing a suggestion of this kind, said Mr. Melling, he thought it not inexpedient to outline his experience consequent upon the claims of certain riparian owners. In the first place he stressed the importance of the clean water problem to the full development of the textile and other industries, and compared present-day conditions with those which led to the passing of the Rivers Pollution Prevention Act of 1876. Distinction was drawn between the scope and powers of this Act and the common law as affecting riparian owners, and attention was directed to the part played in the prevention of abuse of the rivers of the industrial North by the several Joint Rivers Authorities.

As specific instances of water right contentions, involving technical evidence, Mr. Melling reviewed two recent Chancery Court cases upon which important judgments had been delivered. In Hulley *v.* Silversprings Co. the plaintiff as riparian owner established that the defendants, in carrying on their bleaching and dyeing business, had so interfered with the character of the water as to entitle him to an injunction. despite the plea of prescriptive right set up by the defendants. Dealing with the position brought about by the relevant facts, one or two points of considerable interest were noted, In the first place, defendants had no right to discharge their effluent at a spot some 130 yards nearer to the plaintiff's boundary unless they could show that such a change could not possibly affect the plaintiff. The onus of so doing rested on the defendants and they had not discharged it. The evidence showed that in the above distance sedimentation and the natural self-purifying agencies would have materially improved the polluting effluent carried down to the plaintiff's land. Secondly, no prescriptive right to pollute could follow, even if all other difficulties had been removed, and, thirdly, the prescriptive easement claimed absolutely violated the provisions of the Rivers Pollution Prevention Act.

In the more recent case, the Calico Printers' Association *v.* J. Makin and Son, the issue was as to whether the defendants, a firm of paper-makers, had, since the date upon which undisputed pollution had ceased, by reason of the discharge of their effluent into the river about a quarter of a mile above the plaintiffs' intake invaded the riparian rights of the plaintiffs. This case, said Mr. Melling, was a little unusual in that the effluent was of such a quality as to satisfy all due requirements of the Rivers Pollution Prevention Act, the "foul, noxious, and polluting matter" complained of being essentially salts contributing to hardness, mainly calcium chloride. The onus of proof was on the plaintiffs in respect of (1) a sensibly increased impurity at their intake in comparison with the condition at the defendants' intake, and (2) such increase was caused or contributed to by the defendants' effluent. The learned Judge interpreted "sensibly" as "something more than an increase capable of being detected by a meticulous analysis," but which was "capable of being detected in the purposes, be they domestic, agricultural or industrial, for which the water is used." The character of the river, both in volume and quality, its temporary retardation of flow by up-stream riparian owners, the nature and amount of defendants' effluent, and so forth, were all common ground, so that the factors of dilution and diffusion became all-important. In giving judgment in defendants' favour it was held, *inter alia*, to be quite unsafe to deduce any conclusions from the analysis of isolated samples taken at each intake simultaneously or after an interval, unless calculated with reference to the time that must elapse before the water at the upper point reached the lower point. In other words, nothing short of a continuous and contemporaneous sampling over a reasonable period could satisfactorily determine the relative conditions at the two critical points. Details were given of the method by which the plaintiffs' suggestion as to unequal diffusion or short-circuiting of the saline matters in the effluent were negatived, and, in conclusion, the author stressed the importance of collecting all the physical, chemical and engineering data which might have some bearing, however little, on cases of the type he had described.

A general discussion followed, and a vote of thanks to the speaker was proposed by Mr. L. G. Radcliffe, seconded by Mr. Scholefield and carried by acclamation.

Annual Meeting

At the annual business meeting of the Section, which preceded Mr. Melling's paper, Mr. W. M. Marshall, F.I.C., chairman, moved a vote of condolence with the family of the late Mr. William Thompson, who was elected a Fellow of the Institute in 1877, and who had taken a deep interest in the newly-formed Section in Manchester.

Mr. F. Scholefield, after the report and financial statement had been presented by the honorary secretary, stated that the membership of the Institute of Chemistry had altered in character to a considerable extent and now included a very much greater number of industrial chemists than in its earlier years. They did not always feel, however, that the policy of the Institute had developed in sympathy. A great deal more might be done for industrial chemists, and he hoped that all the efforts of the Manchester Section would be directed to sending as many industrial members as possible to the Council.

This matter was discussed by several speakers and it was moved as a recommendation to the Committee that Mr. Scholefield be selected as one of the candidates for the March election of members of the Council. Mr. S. E. Melling, in seconding the motion, which was carried, stated that at Liverpool, on the previous Saturday, Dr. R. B. Foster brought forward a proposition that the Institute and the British Association of Chemists should be brought closer together. From that point of view the more men they got on the Council of the industrial type of chemist, the better.

Dr. Ardern said he would like to raise the question of expenses for members elected to represent the Sections on the Council. He was glad to hear that some move in that direction had been made, the Council having decided to pay, under certain conditions, a portion of the members' expenses. In the past, however, the whole of the expenses had fallen upon the members themselves. In principle he strongly objected to that; he did not think it was in keeping with a democratic society. There was no logical excuse why the Institute should not pay the whole of the expenses of members attending Council meetings. The alternative suggestion was that the Council meetings should be held alternatively in the provinces.

Mr. R. Brightman said they might press for the reduction of the number of members of Council and pay the whole of the expenses. As things were at present, many of the members had only attended one meeting. The official list of attendances should be sent out before the ballot for new members instead of after as now.

Dr. Ardern was proposed as a candidate for the Council, the proposal being seconded by Mr. L. G. Radcliffe.

Chemical Manufactures and German Imports

Mr. A. Humphreys, president of the York Chamber of Trades, and chairman and managing director of Bleasdales, Ltd., manufacturing chemists, in a statement on the position of British industries last week, said that if they were not soon protected, there would be none to protect. In his own trade they had to import very large amounts of German chemicals, but he thought it most unfair that when British manufacturers had put down expensive plant to develop their industries, German manufacturers should be allowed to dump their products in this country at prices at which the home producer could not compete. His own branch of the trade dealt more particularly with synthetic chemicals, and he saw no practical difficulty in the way of imposing an adequate tariff. He knew there was the Reparations duty, but he thought that was more often evaded than not. He did not know that protection would be any special advantage to his own business, but he took a broader view, and in any event if the trade of the big industrial centres of the North continued to be hopelessly depressed through foreign dumping the trade of the wholesale distributing houses would be done.

From Week to Week

DR. HERTY, of New York, who is on a tour to Europe, is at present staying in London.

MR. G. MILNE has been appointed temporary assistant lecturer in Agricultural Chemistry at Liverpool University.

THE VAN DER WAALS memorial lecture is to be delivered by Dr. J. H. Jeans, Sec.R.S., at the Institution of Mechanical Engineers, Storey's Gate, Westminster, on Thursday next, at 8 p.m.

THE UNIVERSITY LECTURESHIP in Bio-Chemistry at Cambridge is vacant by the resignation of Dr. R. A. Peters. Candidates are requested to send their applications to the Registrar by December 1.

THE UPPER PART of a large building at Wilkes and Soames, soap and candle manufacturers, in Tunnel-avenue, Greenwich, was badly damaged by fire on Monday night. The roof of the manufactory was also damaged.

WHILE DR. CRONSHAW, the technical school science expert at Brierley Hill (Staffs) was carrying out some experiments in a laboratory, a mixture of gases fired, and Dr. Cronshaw had the force of the explosion in his eyes.

DR. ANDREW BALFOUR, until recently Director of the Wellcome Bureau of Scientific Research, London, has been appointed Director of the School of Hygiene to be established as the result of the gift of the Rockefeller Foundation.

A PRESENTATION is to be made to Mr. H. E. Coley at the annual dinner of the Chemical Industry Club, in recognition of the leading part he has taken in the establishment and management of the club and of his valuable services as honorary secretary up to a recent date.

DR. C. P. STENMETZ, whose death at Shenectady, New York State, is announced, made a special study in his early days at Breslau, Berlin and Zurich, of mathematics, electrical engineering and chemistry, and ultimately became a recognised authority on electrical problems.

IT IS ANNOUNCED that J. Brown and Co., Ltd., manufacturing chemists, Savile Town, Dewsbury, have taken over the business of Mr. W. C. Wakefield in the same town. The latter business is concerned with the manufacture of hydrochloric acid, salt cake and glauber salts.

PROFESSOR J. W. HINCHLEY, at a meeting of the Chemical Engineering Group of the Society of Chemical Industry, to be held at the Chemical Industry Club, 2, Whitehall Court, London, on Friday, November 16, will read a paper on "A new source of potash and its industrial exploitation."

MR. P. A. ELLIS RICHARDS, F.I.C., president of the Society of Public Analysts, has been appointed by the Minister of Health to be a member of the Departmental Committee on Preservatives and Colouring Matters in Food, in the place of Mr. Otto Hebner, F.I.C., who has resigned from the committee in consequence of having to return to South Africa.

THE INDUSTRIAL chemical plants in New York State showed increased activity in September, according to the State Industrial Commission. The factories making perfumes, soaps and candles expanded operations. Employment went down in the fertiliser plants and in those making photographic chemicals. The manufacture of aniline dyes was further reduced.

ACCORDING TO THE MARKET REPORT issued by Schütz and Co., of Hamburg, economic life in Germany suffers heavily from present events. No improvement in commerce will be possible there until the general situation is cleared up and all difficulties definitely settled. A feature of the report is the growing number of chemical products quoted in pounds sterling.

DR. W. ROSENHAIN, F.R.S., is to lecture before the London Section of the Institute of Metals on "Some impressions of American non-ferrous metallurgy," on Thursday, November 8. Invitations to the lecture may be obtained by sending a stamped and addressed envelope to the hon. secretary, Miss K. E. Bingham, M.Sc., The National Physical Laboratory, Teddington.

SIR ROBERT HADFIELD was presented, on Tuesday, at Birmingham, by Principal Grant Robertson, on behalf of the University, with the Thomas Turner gold medal, in recognition of Sir Robert's distinguished services to metallurgical science and education. Professor Burstall, recalling Professor Turner's valuable research work in metallurgy, said the presentatiou did equal honour to both.

AN INQUIRY was held on Tuesday into the death of John Nixon, aged 46, of Renshaw Street, Patricroft, Manchester, a silver ore smelter, employed at the metal refinery of Johnson, Matthey and Co., Ltd. Nixon, whilst at work on Saturday last, was taken ill and died the following day. A post-mortem examination was carried out by Dr. J. Hall, who stated in evidence that no trace of lead poisoning was found in the body. A verdict of death from natural causes was returned.

THE QUESTION of the appointment of a successor to the late Sir James Dewar in the Jackson Professorship at Cambridge still remains open. The chair was originally endowed to provide professors of chemistry and physics alternately and it is due, therefore, to be filled by a physicist, but it has come to be regarded as a chemical professorship, and in view of a rumoured new chair for physics no appointment has yet been made. A suggestion has been made for the endowment to be divided to provide a Reader in each school.

DR. A. F. DE MOUILPIED, of the British Dyestuffs Corporation, Ltd., addressing the London Rotary Club on Wednesday, said that there were now on the market some 1,400 different colours. In 1913 Germany made 83 per cent. of the world's total production of dyestuffs, and we imported 90 per cent. of our requirements from abroad. To-day, as a result of the war and of Government action, we had a British dyestuffs industry which could and did supply 80 per cent. of our needs. The dyes made were quite equal in fastness and brightness to German dyes.

AT A MEETING of the Institution of Chemical Engineers, to be held at the Engineers' Club, Coventry Street, London, on Wednesday, November 14, at 7.30 p.m., the following papers will be read and discussed:—(1) "A Study of the Conditions of Constant Rate of Flow in Filter Presses," by M. B. Donald and R. D. Hunneman; (2) "A Study of the Absorption Tower," by M. B. Donald and C. W. Tyson. The meeting will be preceded by a dinner, at 6.30 p.m., tickets for which can be obtained from the Hon. Secretary at the offices of the Institution, 307, Abbey House, Victoria Street, Westminster.

THE NOBEL PRIZE for Medicine for 1923 has been awarded to Dr. Banting and Professor Macleod, of Toronto, for the discovery of insulin. The Nobel Prize for Medicine for 1922 has been divided between Professor Archibald V. Hill, University College, London, and Professor Otto Meyerhof, Professor of Physiology at Kiel University. Dr. Banting expresses regret that Dr. Best, one of his colleagues, has not been mentioned in the award. He is anxious that it should be known that Dr. Best had an intimate part in the discovery of insulin, and declares that he will share his own portion of the award with Dr. Best and devote the remainder to medical research.

THE FOLLOWING PAPERS were read at the Ordinary Meeting of the Chemical Society on Thursday: "The rapid admixture of hot combustible gases with air," by Messrs. F. M. Gray and W. E. Garner; "The determination of surface tension from the maximum pressure in bubbles. Part II.," and "The variation of surface tension with temperature and some related functions," by Mr. S. Sugden; "Muconic and hydromuconic acids. Part III. Valency interchange in the hydfomuconic system," and "Experiments on the synthesis of substances possessing the Ladenburg formula. Part I. Derivatives of cyclopropyl-cyclopropane," by Mr. E. H. Farmer.

AT THE ANNUAL smoking concert of the West Riding Section of the Society of Dyers and Colourists, at Bradford on Friday, Mr. H. Jennings (Chairman of the Section) announced that with the December issue the Society's Colour Index would be completed, and in January bound volumes would be available. The completion of the Index after three years' work, at a cost of £6,000, compared with the original estimate of £2,000, marks a distinct step forward by the British dyeing industry. Then Schultz's Farbstofftabellen was the standard index, and contained particulars of 1,001 German and Swiss dyes in 432 pages. The new Colour Index contains details of 1,700 colours in 728 pages, and deals with the dyes of the whole world. It is hoped that it will be recognised as the standard work of reference.

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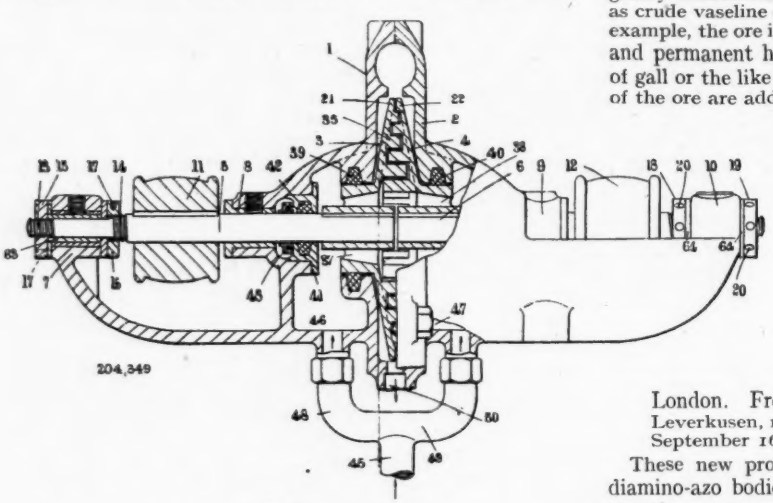
Abstracts of Complete Specifications

204,349. Machines for Disintegrating and Emulsifying Materials. H. Povey, 24, Wolverton Road, Stanmore, Middlesex, and H. O. Hallas, 30, Gressenhall Road, London, S.W.18. Application date, March 29, 1922.

This apparatus is suitable for disintegrating china clay, barytes and other substances in the presence of a liquid to produce a colloidal suspension, and also for emulsifying an intimate mixture of two or more liquids. Two coaxial shafts 5, 6 carry disc members 3, 4, which are adapted to be rotated n opposite directions by power applied to the pulleys, 11, 12.



The shaft 5 is reduced in diameter where it passes through the bearings 7, and is provided with threaded portions 13, 14 to receive nuts 15, 16. The shaft 6 is similarly provided with a screwed end and with nuts 18, 19, so that the clearance between the discs 3, 4 may be varied by adjusting these nuts. The members 3, 4 are provided with annular grooves and alternate annular projections, and these projections carry further projecting blades 35. A number of ducts 37, 38 are provided around the shafts 5, 6, to lead the material between the operative faces of the members 3, 4. Leakage of the material from the outer sides of the discs is prevented by packing rings 39, 40, and further packing rings 42 are provided around the shafts to prevent contamination of the material with lubricant. The material is supplied through the pipe 45 to the inlet chambers 46, 47, and after disintegration is discharged through the pipe 50. The end and radial clearances of the blades are about 1/64th inch, and the width of the annular discharge duct is about 0·03 inch.

204,458. Catalytic Cracking of Heavy Hydrocarbons, Mineral Oils, Oil Residues, Tars or the Like, Process for. Erdöl-und-Kohle-Verwertung Akt.-Ges., 6, Jagerstrasse, Berlin, and E. Erlenbach, 62, Weissenburgerstrasse, Berlin. Application date, August 1, 1922.

In the usual method for cracking heavy hydrocarbons, mineral oils, oil residues, tars, etc., by heating them with or without catalysers, it is found that overheating of the oil in contact with the walls of the still causes coking, which necessitates the removal of the coke deposits. In the present invention, the catalyst is arranged in a deep layer on a perforated partition in the still, and the oil is circulated continuously through the catalyst by means of a pump outside the still. The formation of coke is thus avoided, and intimate contact with the catalyst is ensured. In an example, paraffin having a melting point of 51° C. is cracked in contact with active charcoal at a temperature of 350°-380° C., and the vapour produced is passed through a dephlegmator. A yield of 50-80 per cent. of a transparent distillate having a density of 0·755 and a low boiling point is obtained. The residue consists of a viscous and a solid portion.

204,495. Ores or the Like, Treatment of, by Flotation Processes. A. C. Vivian, 32, Castleton Mansions, Riverview Gardens, Barnes, London. Application date, September 1, 1922.

The process is for treating ores, concentrates or metallurgical products containing oxidised compounds of lead, with or without zinc, in order to separate the lead compound. The selective flotation of the lead compounds is obtained by adding animal gall, bile, or the amido acids present in gall or bile, in association with alkali metal cyanides. The separation is facilitated by adding also a small proportion of oily or greasy substances—*e.g.*, heavy petroleum hydrocarbons such as crude vaseline or paraffin wax of low melting point. In an example, the ore is crushed in water from which the temporary and permanent hardness has been removed, and about 5 lb. of gall or the like per ton, and 3 lb. of sodium cyanide per ton of the ore are added. About 0·1 lb. of crude vaseline per ton is added during crushing, and the mixture then diluted with water and mixed with a similar quantity of vaseline. When this mixture is subjected to flotation the lead concentrate is found in the froth, and by two successive treatments a recovery of 80–90 per cent. of the lead may be obtained, and a recovery of about 90 per cent. of the zinc from the tailings.

204,514. New Intermediate Products, Manufacture of and their Application for Producing Fast Dyeings on the Fibre. W. Carpmael, London. From Farbenfabriken vorm. F. Bayer & Co., Leverkusen, near Cologne, Germany. Application date, September 16, 1922.

These new products are asymmetric dialkyl or alkylaryl diamino-azo bodies which contain in the aromatic nucleus a negative group such as NO_2, Cl or Br, and in which the dialkyl or alkylaryl-amino group is in the ortho position to the azo group. They are prepared by diazotising orthoamino-dialkyl or alkylaryl anilines containing a negative group, and combining the resulting diazo compound with an aromatic amine which may be subsequently further diazotised. Suitable anilines include 4-chloro-2-amino-1-dimethylaminobenzene, 4-nitro-2-amino-1-dimethylaminobenzene, and 4-nitro-2-amino-N-methyldiphenylamine; the latter is obtained by partial reduction of 2 : 4-dinitro-N-methyldiphenylamine with sodium hydro-sulphide. Suitable aromatic amines include paraxylidine, 2-amino-4-methoxy-1-methylbenzene (cresidene), and meta-amino-acetanilide. To produce fast black dyeings on the fibre the goods are impregnated with arylides of 2 : 3-oxynapthoic acid, and treated with the diazo compounds of these new intermediate products. Detailed examples are given.

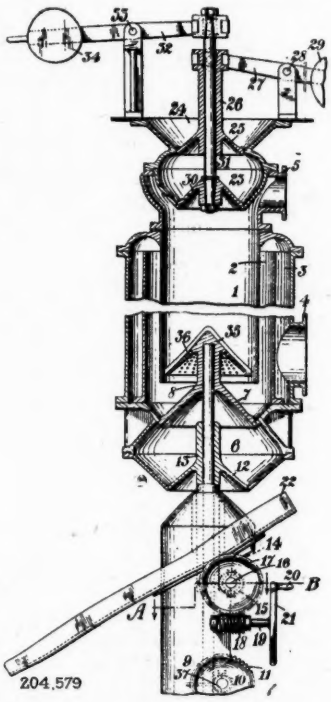
204,528. Paradichlorbenzene and Chlor-Anthraquinone, Manufacture or Production of. H. Dodd, W. C. Sprent, and The United Alkali Co., Ltd., Cunard Building, Liverpool. Application date, September 29, 1922.

It is known that chlorbenzoyl-benzoic acid may be obtained by the condensation of monochlorbenzene with phthalic anhydride in the presence of aluminium chloride, and the benzoyl-benzoic acid may subsequently be condensed to β- or 2-chloranthraquinone by means of sulphuric acid. It is now found that orthodichlorbenzene (which has previously been a waste by-product in mono-chlorbenzene manufacture) may be substituted for monochlorbenzene under certain conditions. A mixture of orthodichlorbenzene and paradichlorbenzene may be used, since the para compound does not take part in the reaction. Phthalic anhydride is added to orthodichlorbenzene, aluminium chloride is added, and the temperature gradually raised to 115° C. The mixture is cooled, run into water, made alkaline, and unchanged dichlorbenzene separated. The liquor is acidified, and the benzoyl-benzoic acid filtered off and heated with sulphuric acid to 100°—155° C. to obtain 2-chloranthraquinone. Alternatively, the reaction mixture after heating to 115° C. may be run directly into the sulphuric acid. The process also effects the separation of the two isomers of dichlorbenzene, and paradichlorbenzene may thus

be obtained without refrigeration. The process gives a yield of about 80 per cent. on the phthalic anhydride taken.

204,579. RETORTS OR STILLS. F. Lamplough, Highfield, Eltham, Middlesex, and N. C. T. Harper, 571, Essenwood Road, Durban, Natal, South Africa. Application date, November 14, 1922.

The retort is more particularly for the destructive distillation of shale, and the object is to obtain a uniform heating by means of furnace gases. The distillation chamber 1 is surrounded by two concentric jackets 2, 3. Superheated steam in large excess is passed through the furnace, and the mixture of flue gas and steam is drawn by means of a suction fan



through the pipe 4 into the jacket 3. The hot gas then passes into the jacket 2, in which it is uniformly distributed, and local overheating of the chamber 1 is avoided. The hot gas then passes through the perforated base 35 into the distillation chamber, and the vapour products are drawn off through the pipe 5. The base 35 and conical valve 7 are mounted on the shaft 8 carrying rack 9, which may be operated from a hand wheel through gearing to raise and lower valve 7. The base 35 acts as an additional valve during the opening and closing of the valve 7 to discharge the residue to the hopper 6. The latter is provided with a discharge valve 12, carried by a hollow shaft 13, which is also operated by a rack and pinion gearing. The distillation chamber may thus be maintained in sealed condition by means of the two valves. The raw material is charged into the retort from a trough 24 by means of two valves 25, 30, which are opened in succession by means of counter-weighted levers 27, 32, to keep the retort airtight.

204,594. P-NITROPHENETOLE FROM *p*-NITROCHLORBENZENE, MANUFACTURE OF. W. Lewcock, of The Gas Light and Coke Co., Tar and Ammonia Products Works, Beckton, London, E.16, and The Gas Light and Coke Co., Horseferry Road, Westminster, London, S.W.1. Application date, December 2, 1922.

When *p*-nitrochlorbenzene is heated with an alkaline reagent such as sodium ethoxide, *p*-nitrophenetole is obtained, together with some dichlor-azoxybenzene as a by-product if the reaction is conducted at boiling point. The formation of the azoxy compound may be avoided if a lower temperature is employed, but in this case the reaction is prolonged. The conditions have now been found under which the process may be carried out expeditiously without the formation of by-products. *P*-nitrochlorbenzene is heated in aqueous alcoholic solution with sodium ethoxide at or above the boiling point of the aqueous alcohol, in an autoclave to avoid ebullition. The chloro derivative is in low concentration, about 3—5 per cent. The alkaline reagent should not be above the chemical equivalent of the chloro derivative, and the formation of the azoxy compounds is prevented by reducing the alkali still further. The aqueous alcohol should be about 85 per cent. and the autoclave should have a protective lining such as enamel, silver, or nickel to avoid reducing conditions. In an example, 100 grams of *p*-nitrochlorbenzene are heated to 95°—120° C. in an enamelled iron autoclave with 3,000 c.c. of 85 per cent. aqueous alcohol containing 15 grams of dissolved sodium. The product of the reaction consisted of *p*-nitrophenetole, unchanged nitrochlorbenzene, and traces of *p*-nitrophenol, but no dichlor-azoxybenzene.

204,662. BORNEOL AND ISOBORNEOL, PRODUCTION OF. J. Schindelmeiser, Dorpat, Esthonia. Application date, April 6, 1923.

The monobasic fatty acid esters of borneol and isoborneol are not readily saponifiable with aqueous solutions of caustic alkalies unless high pressures are used, or unless alcoholic solutions are used. In the present invention the use of alcohol or high pressures may be avoided if the ester is first mixed with solid caustic alkali, and hot water is then added to the mixture; the alkali should be in 50 per cent. excess. In an example borneol acetate is mixed with dry caustic soda and then with hot water, and kept at 100° C. to complete the saponification. The borneol and sodium acetate are then separated, the acetate being of high purity.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: —182,488 (Nitrogen Corporation), relating to solutions of cellulose esters, see Vol. VII., p. 356; 182,803 (Ges. für Kohlentechnik), relating to separation of ammonia and benzol hydrocarbons from coal distillation gases, see Vol. VII., p. 356; 183,123 (Durand et Huguenin Soc. Anon.), relating to mordant dyeing colouring matters, see Vol. VII., p. 392; 187,592 (H. Howard), relating to production of hydrogen sulphide, see Vol. VII., p. 943; 189,136 (E. Barbet et Fils et Cie), relating to continuous large-scale production of absolute alcohol, see Vol. VIII., p. 103; 190,694 (Nitrogen Corporation) relating to treatment of cellulose esters, see Vol. VIII., p. 183; 192,703 (Soc. d'Etudes Chemiques pour l'Industrie), relating to manufacture of urea from cyanamide, see Vol. VIII., p. 406.

International Specifications not yet Accepted

202,997. ARTIFICIAL RESINS. Chemische Fabrik auf Actien (vorm. E. Schering), 170, Mullerstrasse, Berlin. (Assignees of E. Freund and H. Jordan, 170, Mullerstrasse, Berlin.) International Convention date, August 24, 1922.

These resins are obtained by the reaction of an organic halogen compound, and an aromatic hydrocarbon or derivative, in the presence of not more than 10 per cent. of a metallic compound, a metal, or a porous substance. The reacting substances of the Friedel-Craft's reaction, excluding alkylbenzene halides, are suitable. Examples are given in which the following reacting substances are heated together: (1) naphthalene, naphthalene tetrachloride, and iron oxide or fuller's earth, (2) acetyl chloride, naphthalene, and anhydrous iron chloride, (3) chloroform, toluene, and aluminium chloride, under a reflux condenser, (4) chloroform, naphthalene, and aluminium chloride, (5) acetylene tetrachloride, xylene, and aluminium chloride, (6) ethylene dichloride, toluene, and aluminium chloride, (7) naphthalene tetrachloride, phenols from low-temperature tar, and iron oxide. The products may be dissolved, and then decolorized with fuller's-earth.

203,301. BASIC LEAD ACETATE AND WHITE LEAD. G. F. Lloyd, Coronation Street, Brighton, Victoria, Australia, F. B. Clapp, 475, Collins Street, Melbourne, and F. H. Campbell, 35, William Street, Melbourne. International Convention date, August 30, 1922.

100 parts of litharge are treated with 16–22 per cent. absolute acetic acid in solution; sodium acetate and sulphuric acid may also be present. The product is a basic lead acetate containing 10–73 per cent. of water. This product is treated with a solution of sodium, potassium, or ammonium carbonate,

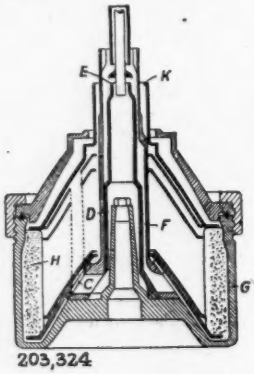
mixed with bicarbonate partly in solution and partly in suspension, and partly added dry. If ammonium carbonate is used, carbon dioxide should be present under slight pressure. The proportions used are 1 part of litharge contained in the basic acetate to 0.2–0.4 parts of the mixed carbonates. The mixed carbonates may contain 60–75 parts bicarbonate to 40-25 parts carbonate. White lead is precipitated and separated, and any alkali carbonates absorbed in it are washed out with water or with normal or basic lead acetate in dilute solution.

203,310. SYNTHETIC RESINS. Soc, of Chemical Industry, in Basle, Switzerland. International Convention date, September 1, 1922.

Specification 186,107 (see THE CHEMICAL AGE, Vol. VII., p. 610.) describes resins of the aromatic series containing hydroxyl and sulphur. These resins are now esterified to obtain resins which are insoluble in alcohol or alkali, but soluble in halogen hydrocarbons or hydroaromatic hydrocarbons. Referring to Specification 186,107, (1) the phenol-sulphur resin is treated with acetic anhydride, benzoyl chloride, *p*-toluene-sulphochloride, or abietic acid and thionyl chloride, (2) the α-naphthol-sulphur resin is treated with acetic anhydride, (3) the resorcin sulphur resin is treated with benzoyl chloride. A phenol-sulphur-chloride resin described in Specification 13,657/13 is treated with acetyl chloride. These resins may be made more elastic by adding triphenyl-phosphate, camphor, camphor substitutes or natural resins, and they may be dissolved and mixed with cellulose esters or rubber. The products are suitable for impregnating purposes or for varnishes.

203,324. CENTRIFUGAL SEPARATORS. Aktiebolaget Separator, 8, Flemminggatan, Stockholm. International Convention date September 4, 1922.

A mixture containing oils or fatty substances is fed through passages E, D, C to a bowl G, which is heated electrically to such a temperature that only the substances to be separated



203,324

are solid. The solids collect in a layer H, the outer portion of which is melted by a heating medium supplied through passages F and discharged through a passage K. The heating medium may be the same as the separated solids, and its flow is regulated to keep the layer H a uniform thickness. A partition may separate the heating medium from the separated solids. The electric heater may be inside or outside the bowl, or electric currents may be induced in the wall of the bowl to heat it.

LATEST NOTIFICATIONS.

205,790. Manufacture of new indigoid dyestuffs. Farbenfabriken vorm. F. Bayer and Co. October 19, 1922.

205,813. Manufacture of alcohol and yeast. Dr. E. Klein. August 29, 1922.

205,827. Manufacture of germicidal and fungicidal products. Koholyt Akt.-Ges. October 21, 1922.

205,834. Process of preparing bacteria particularly suitable for producing the indigo vat. Farbwerke vorm. Meister, Lucius and Brüning. October 23, 1922.

Specifications Accepted, with Date of Application

188,657. Metals from their chloride vapours, Process for obtaining. S. J. Vermaes and L. L. J. van Lijnden. November 14, 1921.

188,665 Gases, Compression, storage, and treatment of. Naamlooze Vennootschap, Algemeene Norit Maatschappij. November 14, 1921.

192,410. Absolute alcohol, Continuous process and apparatus for the production of large quantities of. E. Barbet et Fils et Cie. January 26, 1922. Addition to 189,136.

197,315. Ethyl alcohol from sulphovinic acid, Manufacture of. Compagnie de Béthune Soc. Anon. May 4, 1922.

205,122. Tin ores and concentrates, Process for treating. A. A. Lockwood. April 12, 1922.

205,141. Sulphur. Recovery and refining of. C. S. Robinson. June 12, 1922.

205,150. Iron ores, Process for reducing. O. Dony and X. de Spirlet. June 28, 1922.

205,167. Phenol formaldehyde condensation products, Production of. G. Petroff. July 7, 1922.

205,176. Zinc from ores and the like, Process for the electrolytic extraction of. F. Hansgirg. July 10, 1922.

205,195. Compositions or preparations with cellulose derivatives, Manufacture of. H. Dreyfus. July 13, 1922.

205,224. Sulphur dioxide, Manufacture of, and apparatus for use therein. C. R. Houseman and British Oxygen Co., Ltd. July 19, 1922.

205,254. Dichlor-fluorane, Process for the manufacture of. British Dyestuffs Corporation, Ltd., and H. H. Hodgson. July 28, 1922.

205,268. Coal and other carbonaceous substances, Destructive distillation of. T. M. Davidson. August 15, 1922.

205,269. Ores and other metalliferous materials, Chloridising roasting of. A. L. Mond. (*International Process and Engineering Corporation.*) August 15, 1922.

205,288. Oxides of nitrogen and nitric acid, Manufacture of. C. J. Goodwin. September 5, 1922.

205,301. Ammonium sulphate, Drying of. G. Weyman. September 14, 1922.

205,304. Vat dyestuffs, Manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) September 18, 1922.

205,399. Coal and other solid hydrocarbonaceous material, Destructive distillation of. G. E. Heyl. Dec. 14, 1922.

205,430. Washing material which has been separated by centrifugal action, Apparatus for. Chemische Fabrik Griesheim-Elektron and F. Sander. March 12, 1923. Addition to 187,429.

Applications for Patents

Akt.-Ges. für Anilin-Fabrikation and Bloxam, A. G. Manufacture of dyestuffs for wool. 26,476. October 23.

Australian Lanoline Proprietary, Ltd. Treatment of liquids containing oily or fatty substances, etc. 26,461. October 23. (Australia. October 23, 1922.)

Baddiley, J., and Tatum, W. W. Dyes. 26,485. October 23.

British Dyestuffs Corporation, Ltd., and Tatum, W. W. Dyes. 26,724. 26,725. October 25.

Bhopal Produce Trust, Ltd., Fraymouth, W. A., and Wade, H. Recovery of oxalates, etc. 26,736. October 25.

Bhopal Produce Trust, Ltd., Fraymouth, W. A., and Wade, H. Recovery of organic, etc., substances from vegetable matter. 26,737. October 25.

Bhopal Produce Trust, Ltd., Fraymouth, W. A., and Wade, H. Recovery of oxalic matter from natural products. 26,738. October 25.

British Cellulose and Chemical Manufacturing Co., Ltd., and Ellis, G. H. Treatment of cellulose acetate, etc. 26,572. October 24.

Cam, F. Plating metal with chromium and nickel. 26,949. October 27.

Came, R. R. Manufacture of ink. 26,472. October 23.

Etablissements Poulenc Frères and Oechslin, C. Manufacture of hydroxylated aliphatic arsinic acids. 26,617. 26,618. October 24. (France, October 26, 1922.)

Farbwerke vorm. Meister, Lucius and Brüning. Preparing bacteria for producing indigo-vat, etc. 26,475. October 23. (Germany, October 23, 1922.)

Henkel, F. Recovery of phosphoric acid from phosphates. 26,557. October 24.

Henshaw, S. Production of neutral sulphate of ammonia. 26,526. October 24.

Hoffmann-La Roche and Co., Akt.-Ges., F., and Morton, A. Home. Manufacture of o-o-diacyl derivatives of diphenolisatine, etc. 26,703. October 25.

Koholyt Akt.-Ges. Manufacture of germicidal and fungicidal products. 26,349. October 22. (Germany, October 21, 1922.)

Lantz, R., Soc. Anon. des Matières Colorantes et Produits Chimiques de Saint-Denis, and Wahl, A. Manufacture of derivatives of naphthoquinone. 26,612. October 24. (France, October 28, 1922.)

Soc. des Etablissements Barbet. Apparatus for production of formol by catalysis. 26,749. October 25. (Belgium, October 30, 1922.)

Stonier, S., and Talk o' th' Hill Colliery, Ltd. Production of neutral sulphate of ammonia. 26,526. October 24.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers ; those interested in close variations in prices should study the market report.

London, October 31, 1923.

THE improved outlook noted in our last report has been maintained during the present week. Trade generally in most heavy chemicals shows a fair amount of expansion, and supplies of quite a number of products are becoming more difficult to obtain for near delivery.

Already several chemicals are firmer, and with any prolonged continuance of the present Continental situation some sharp advances must be looked for.

Export trade is without special feature, although the inquiry has improved.

General Chemicals

ACETONE continues firm, with stocks on the light side.
ACID ACETIC.—The price is firm, and quite a satisfactory business has been transacted.
ACID CITRIC.—Unchanged.
ACID LACTIC continues scarce, and the price very firm.
ACID OXALIC is unchanged in price, and an advance would appear to be imminent.
ARSENIC is firmer in view of the improved export demand.
BARIUM CHLORIDE is a slightly better market, but the price still continues easy.
FORMALDEHYDE is quite a satisfactory market, and the price is firm.
LEAD ACETATE has registered a further advance, and is scarce.
LEAD NITRATE.—Only a moderate business is reported, with price unchanged.
LIME ACETATE seems to be in slightly better supply, but the price is well maintained, and a good business is reported.
LITHOPONE.—Business is satisfactory, and the price is very firm.
CARBONATE AND CAUSTIC POTASH.—Only a moderate business is reported.
PERMANGANATE OF POTASH.—Satisfactory business has been transacted, and the price is very firm.
PRUSSIATE OF POTASH.—The price is maintained, and rather a better business is reported.
SODIUM ACETATE.—This product seems to be a shade easier, although the demand is good.
SODIUM HYPOSULPHITE.—Good business is reported at British makers' figures.
SODIUM PRUSSIATE.—The price is firmer, although the business is still only moderate.
SODIUM SULPHIDE is in good request, and the price is well maintained.
ZINC SALTS.—Unchanged.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID continues firm and in good demand.
ACETANILID is scarce and has advanced to a higher level.
ACID SALICYLIC.—Stocks are light and firmly held.
AMIDOPYRIN has been in demand for export.
BROMIDES.—The firm tendency continues.
HYDROQUINONE.—Owing partly to supplies from Germany being interrupted advanced prices have been realised for spot parcels.
MILK SUGAR.—Quiet. Continental manufacturers are asking higher prices for forward delivery.
PHENACETIN.—Firmer ; some holders being unwilling to sell at current rates.
PHENOLPHTHALEIN.—Stocks are light and firmly held.
QUININE.—Supplies which have been offered below actual makers' prices appear to be practically exhausted.
SALOL has advanced.
SODA SALICYLATE.—Considerable business has again been transacted, the leading makers having largely sold their production for the current year.
VANILLIN is a slow market and unchanged.

Coal Tar Intermediates

The home market continues rather quiet, with only one or two much inquired for, but export buyers continue to be interested, and as Germany is apparently less and less able to supply for any reasonable delivery, orders seem to be gravitating to this country.

ALPHA NAPHTHOL continues firm, and delivery would be a matter of arrangement for any bulk quantities.
ALPHA NAPHTHYLAMINE is without change and has been rather quiet.
ANILINE OIL AND SALT.—The chief interest has been on export account.
BENZIDINE BASE.—Some small export orders have been received and a little home trade business is passing.
BETA NAPHTHOL.—Home business is on the small side, but fair export inquiry is in the market.
BETA NAPHTHYLAMINE has been more interesting than of late.
DIMETHYLANILINE continues to pass regularly into consumption, and the price is unchanged.
DINITROPHENOL has been in fair request.
" F " ACID.—A moderate business is reported.
METANITRANILINE.—Foreign orders have been booked on a small scale.
METAPHENYLENEDIAMINE.—The same remarks apply.
RESORCINE TECHNICAL.—Spot supplies seem rather short, and several orders are open.

Coal Tar Products

The market generally is steady, and a fair amount of business is passing.

90% BENZOL is without change at 1s. 4d. per gallon on rails.
PURE BENZOL is still slow of sale, without change in value.
CREOSOTE OIL is steady at 8¼d. to 8½d. per gallon on rails in the North, and a penny per gallon more in the South.
CRESYLIC ACID is still somewhat inactive, but without change in price. To-day's quotation for the pale quality 97/99% is 1s. 10d. to 2s. per gallon on rails, while dark 95/97% is quoted at 1s. 6d. to 1s. 8d. per gallon on rails.
SOLVENT NAPHTHA.—The demand is still somewhat poor, but some business has been done for export. The value to-day is 11d. to 1s. per gallon on rails, according to position.
HEAVY NAPHTHA is slow of sale, and without change in value.
NAPHTHALENES continue to be in poor demand, and no improvement in prices is reported. To-day's quotations are £6 10s. to £7 for the low grade quality ; £7 10s. to £8 for 74/76 and £8 10s. to £9 for 76/78.
PITCH is still in only moderate demand, and quotations are practically unchanged. To-day's values are 140s. to 145s. f.o.b. London, 137s. 6d. to 140s. f.o.b. East Coast, and 135s. to 140s. f.o.b. West Coast.

Sulphate of Ammonia

There is no change in the position.

[Current Market Prices on following pages.]

Chile Nitrate Report

IT is reported from Valparaiso that a law authorising the Government to proceed with the sale of nitrate fields has been passed by Congress, and the yield from these sales is to be applied to the reduction of the Budget deficit for the current year.

No sales of nitrate have been reported during the week ending October 27, and the aggregate amount sold for delivery during the nitrate year 1923-1924 therefore remains at 12,995,531 metric quintals.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	127	10	0	to	130	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	48	0	0	to	49	0	0
Acetic, 40% pure	ton	24	0	0	to	25	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	1	1½	to	0	1	2½
Citric	lb.	0	1	5	to	0	1	5½
Formic, 80%	ton	50	0	0	to	51	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	39	0	0	to	40	0	0
Lactic, 60 vol.	ton	44	0	0	to	46	0	0
Nitric, 80 Tw.	ton	26	0	0	to	27	0	0
Oxalic	lb.	0	0	6	to	0	0	6½
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	1½	to	0	1	2
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	26	0	0	to	28	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	35	0	0	to	37	10	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	65	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	15	0	0	to	15	10	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	7	6	to	10	17	6
Borax crystals, commercial	ton	25	0	0	to	—		
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	21	10	0	to	22	10	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	10	0	to	26	0	0
Cream Tartar, 98–100%	ton	86	0	0	to	88	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	70	0	0	to	72	0	0
Formusol (Rongalite)	lb.	0	2	1	to	0	2	2
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	18	0	0	to	20	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	41	0	0	to	42	0	0
Carbonate (White Lead)	ton	43	0	0	to	45	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	50	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	30	0	0	to	32	0	0
Potassium bichromate	lb.	0	0	5½	to	0	0	6
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to	—		
Metabisulphite, 50–52%	ton	65	0	0	to	70	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	2	10	to	0	3	0
Prussiate, yellow	lb.	0	0	10½	to	0	0	11
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	3	3	0	to	—		
Seconds	cwt.	3	0	0	to	—		
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4½
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3	to	0	0	3½
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	27	10	0	to	28	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	6	to	0	0	6½
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62 %	ton	14	10	0	to	15	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	0	11½	to	0	1	0
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	4	to	0	3	8
Acetanilid	lb.	0	2	0	to	0	2	3
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	6	to	0	2	9
Salicylic, B.P.	lb.	0	2	3	to	0	2	6
Tannic, leviss	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	9	to	0	8	3
Amidopyrin	lb.	0	13	6	to	0	14	0
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	16	6	to	0	17	0
Beta naphthol resublimed	lb.	0	2	0	to	0	2	3
Bromide of ammonia	lb	0	0	8	to	0	0	9
Potash	lb.	0	0	6¾	to	0	0	7½
Soda	lb.	0	0	7½	to	0	0	8½
Caffeine, pure	lb.	0	10	9	to	0	11	0½
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0½
Lactate	lb.	0	1	10	to	0	2	0
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	4	0	to	0	4	3
Cocaine alkaloid	oz.	0	19	6	to	1	0	0
Hydrochloride	oz.	0	16	9	to	0	17	3
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	8	to	0	2	10
B.P. (75–80% eucalyptol)	lb.	0	2	9	to	0	2	11
Guaiacol carbonate	lb.	0	11	0	to	0	11	6
Liquid	lb.	0	8	9	to	0	9	3
Pure crystals	lb.	0	9	3	to	0	9	9
Hexamine	lb.	0	4	0	to	0	4	3
Hydroquinone	lb.	0	4	0	to	0	4	3
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	17	6	to	0	19	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	8	to	0	3	2
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	2	6	to	4	10	0
Paraldehyde	lb.	0	1	5	to	0	1	6
Phenacetin	lb.	0	6	6	to	0	7	0
Phenazone	lb.	0	8	3	to	0	8	6
Phenolphthalein	lb.	0	7	3	to	0	7	6
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3	to	—		

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	6	to	0	5	9
Salicylate of soda powder	lb.	0	2	8	to	0	2	10
Crystals	lb.	0	2	9	to	0	3	0
Salol	lb.	0	3	9	to	0	4	3
Soda Benzoate	lb.	0	2	6	to	0	2	9
Sulphonal	lb.	0	16	0	to	0	16	6
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	11	0	to	0	11	6
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9	to	0	0	9½
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	6	to	0	2	9
Benzidine, base	lb.	0	4	9	to	0	5	0
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	6	to	0	3	9
H-Acid	lb.	0	4	9	to	0	5	0
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	6	to	0	2	8
Naphthionate of Soda	lb.	0	2	6	to	0	2	8
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay		0	12	0
Bergamot		0	13	6
Cajaput		0	3	3
Camphor, white	per cwt.	4	0	0
Brown	„	3	15	0
Cassia	c.i.f. 10/0 spot	0	11	0
Cedarwood		0	1	4½
Citronella (Ceylon) Both spot & forward very scarce	c.i.f. 3/10½ sp.	0	4	2
(Java) Very firm and dearer	c.i.f. 4/6 spot	0	4	6
Clove		0	8	6
Eucalyptus		0	2	6
Geranium Bourbon		1	15	0
Lavender		1	4	0
Lavender spike	dearer	0	3	3
Lemon		0	2	10
Lemongrass	per oz.	0	0	2½
Lime (distilled)		0	4	0

	£	s.	d.
Orange sweet (Sicilian)	0	10	6
(West Indian)	0	9	0
Palmarosa	1	3	0
Peppermint (American)	0	14	6
Mint (dementholised Japanese)	0	12	0
Patchouli	1	10	0
Otto of Rose per oz.	1	15	0
Rosemary	0	1	7
Sandalwood	1	6	0
Sassafras	0	7	0
Thyme 2/6 to	0	8	0

Synthetics.

Benzyl acetate	per lb.	0	3	0
Benzoate	„	0	3	0
Citral	„	0	10	0
Coumarine	dearer „	1	0	0
Heliotropine	firm „	0	8	0
Ionone	„	1	5	0
Linalyl acetate	firm „	1	2	6
Methyl salicylate	„ „	0	2	9
Musk xylol	dearer „	0	12	0
Terpeniol	easier „	0	2	9

Claim Against Dyeing Firm

Agent Sues for Commission

THE trial of an action claiming an amount of money alleged to be due as commission came before Vice-Chancellor Lawrence, K.C., at the Lancashire Chancery Court, at Manchester, on Thursday, October 25. The plaintiff was Mr. Alfred Ingham, Buxton Road, Macclesfield, and the defendant W. Hall and Co. (Monsall), Ltd., dyers, Monsall, Newton Heath. It was explained that the plaintiff was appointed by W. Hall and Co. as their agent for Macclesfield, Leek, and district, his remuneration to be 2½ per cent. on the business done by the firm in that area. He alleged that, in addition, he was also to receive a similar commission on business done in other parts of the country with customers whom he introduced, and who paid accounts direct to the defendant firm. The plaintiff was a man well known in the silk industry, and he was able, it was said, to introduce a large number of customers. A bad period of trade set in during 1920, during which there were no transactions with the firm of Courtauld and Co. Coventry and Braintree. When, in 1922, business with this firm was renewed, he was not allowed commission on that account, and he now sought to enforce his claim. The defence was a denial that, in the circumstances of the case, the commission was due to the plaintiff.

Mr. M'Cleary, for the defendants, submitted that the contract relating to the order in dispute was a special contract. The plaintiff had not looked after the account. An expert was wanted for a special piece of work, and, there being only about two experts in the country who could carry it out, the defendants being one of them, the work was given to Messrs. Hall.

At the close of a short argument, the Vice-Chancellor said he would give judgment on Monday, November 5.

The Value of Business to Civilisation

THE well-known chemical manufacturers, F. W. Berk and Co., Ltd., of Fenchurch Avenue, London, have produced a handsome booklet which breaks away from traditional advertising methods and is devoted almost entirely to an illustrated description of the ports and trade centres of the Empire. A brief description of the company's works appears at the end, quoted from an article in *The Business World*, which also provides the name for the brochure. To quote the booklet in question: "Statecraft and military prowess have played their parts, potently and picturesquely enough, in the drama of empire; but in the effects that make for stability and permanence both have been surpassed by the power of business, which has the paradoxical quality of being at once the product of self-interest and the promoter of the commonweal. One old writer says: 'Commerce is the most solid foundation of civil society, and the most necessary principle to unite all men, of whatever country or condition. . . . By it the mercantile people of nations seem to be one body incorporated.' Its promotion of international amity and intercourse has, indeed, always appealed strongly to those who sympathise with that lofty ideal, the brotherhood of man."

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, November 1, 1923.

CONSIDERING the unsettled conditions on the Continent, business during the past week has been fairly satisfactory.

Continental quotations are inclined to be higher than a week ago, and spot prices are firmer in consequence.

Industrial Chemicals

ACID, ACETIC, GLACIAL 98/100%.—About £60 to £65 per ton in casks; 80% pure, £51 to £53 per ton; 80% technical, £47 to £48 per ton, c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystals or granulated £48 per ton; powdered £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC.—Ice crystals. Inclined to be easier at about 1s. 1¾d. per lb., f.o.b. U.K. ports.

ACID CITRIC.—B.P. crystals. In little demand, price about 1s. 4½d. per lb., less 5%, but could probably be obtained at less.

ACID FORMIC, 85%.—Moderate inquiry. Price unchanged at about £49 per ton, ex store, spot delivery.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Quoted 6d. per lb., ex store, but very little demand, and could probably be obtained cheaper.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC.—B.P. crystals. Spot lots on offer at about 1s. 1d. per lb., less 5%.

ALUMINA, SULPHATE.—Cheaper continental quotations. 17/18% technically iron free quality offered at about £8 5s. per ton, ex wharf, early shipment.

ALUM, CHROME.—Price unchanged at about £24 to £27 per ton, according to quality, f.o.b. U.K. port.

ALUM POTASH (LUMP).—English material about £10 17s. 6d. per ton, f.o.b. U.K. port. Continental material quoted £10 per ton, c.i.f. U.K. ports. Spot material about £10 15s. per ton, ex store.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5½d. per lb., ex station, spot delivery. Moderate export inquiry.

AMMONIA LIQUID, 880°.—Unchanged at 3d. per lb., delivered, containers extra.

AMMONIA MURIATE.—Grey galvanizers quality unchanged at about £31 per ton. Continental quotations for fine white crystals inclined to be higher at about £24 per ton, c.i.f. U.K. port. Spot lots on offer at £26 5s. per ton, ex store.

AMMONIA SULPHATE.—25¼% material, £13 1s. per ton; 25¾% neutral quality, £14 5s. per ton, ex works, November delivery.

ARSENIC, WHITE POWDERED.—Better inquiry and prices inclined to be higher. Now quoted £62 per ton, ex quay, early delivery, spot lots about £67 per ton, ex store.

BARIUM CARBONATE.—98/100% prec., continental quotations inclined to be higher at about £12 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—English material unchanged at about £15 per ton, ex store. Continental material quoted £13 7s. 6d. per ton, c.i.f. U.K. ports.

BARYTES.—Finest white English unchanged at £5 5s. per ton, ex works. Good quality continental material offered at £5 per ton c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots, £11 5s. per ton, ex station. Contracts, 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations. Minimum tons lots.

CALCIUM CHLORIDE.—English material, £5 12s. 6d. per ton, ex station. Offered for export at about £4 10s. per ton, f.o.b. U.K. port.

COPPERAS, GREEN.—Unchanged at about £2 2s. 6d. per ton, f.o.b. for export.

COPPER SULPHATE.—Moderate export inquiry. Now quoted at £25 7s. 6d. per ton, less 5 per cent. f.o.b. U.K. port.

FORMALDEHYDE, 40%.—Spot material inclined to be higher to £63 to £64 per ton, ex wharf.

GLAUBER SALTS.—Fine white crystals quoted £3 10s. per ton, ex store, spot delivery. Offered from the continent at £2 15s. per too, c.i.f. U.K. port.

LEAD, RED.—English manufacturers now quote £44 per ton carriage paid U.K. stations. Continental material higher at about £34 10s. per ton, c.i.f. U.K. ports. Spot lots on offer at £36 per ton, ex store.

LEAD, WHITE.—Continental quotations of about £36 10s. per ton, c.i.f. U.K. ports, prompt shipment.

LEAD ACETATE.—White crystals dearer at about £43 per ton, ex wharf, spot delivery. Brown about £41 10s. per ton. White crystals offered from the continent at £39 10s. per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Finest English ground quoted £8 per ton, ex station. Offered from the continent at about £7 7s. 6d. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Offered from the continent at £2 7s. 6d. per ton, c.i.f. U.K. ports, prompt shipment. Spot lots quoted £3 5s. per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality offered at about £5 per ton, ex store. B.P. quality, £6 5s. per ton, ex station, prompt delivery.

POTASH, CAUSTIC, 88/92%.—Continental material offered at about £29 5s. per ton, c.i.f. U.K. ports. Spot lots quoted £32 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Continental quotations inclined to be higher at about £25 per ton, c.i.f. U.K. ports. Spot lots unchanged at about £27 per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at about 3d. per lb.

POTASSIUM NITRATE (Saltpetre).—Offered from the continent at about £26 per ton, c.i.f. U.K. ports. Spot lots on offer at about £30 per ton.

POTASSIUM PERMANGANATE.—B.P. crystals, unchanged at about 9¾d. per lb., ex store, spot delivery.

POTASSIUM PRUSSIATE (Yellow).—Price further reduced to about 10½d. per lb., ex station, spot delivery.

SODA, CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station, spot delivery. Contracts, 20s. per ton less.

SODIUM ACETATE.—Price for spot lots remains unchanged at about £24 15s. per ton, ex store. Offered for early delivery from the continent at £23 per ton, c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Continental material now quoted £9 10s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots about £10 10s. per ton, ex store. Pea crystals quoted £14 10s. per ton, ex store.

SODIUM NITRATE.—Refined 96/98% quality quoted £13 5s. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE 100%.—Price £26 10s. to £28 10s. per ton according to quantity, f.o.b. U.K. port. Moderate export inquiry.

SODIUM PRUSSIATE (Yellow).—In little demand, now quoted 5¾d. per lb., ex store.

SODIUM SULPHATE (Saltcake).—£4 per ton, ex station for home consumption. Good export inquiry.

SODIUM SULPHIDE.—60/65% solid, £14 per ton, ex station; broken, £1 per ton more; 31/34% crystals, £8 15s. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 4d. per lb.

ZINC CHLORIDE.—98/100% solid or powder offered from the continent at £25 per ton, c.i.f. U.K. port. English material quoted £26 per ton, f.o.b. for export.

ZINC SULPHATE.—Offered from the continent at about £11 5s. per ton, c.i.f. U.K. port. Spot lots quoted £14 10s. per ton, ex store.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Some export inquiries. Price 1s. 6d. per lb., f.o.b.

BETA NAPHTHOL.—Moderate demand. Price, 1s. 1d. lb. delivered.

BETA NAPHTHOL R.—Some home inquiry. Price 1s. 4d. lb. delivered.

BENZIDINE BASE.—Home inquiry. Price 4s. 9d. lb. 100% basis, carriage paid.

DIPHENYLAMINE.—Home and foreign inquiries. Price quoted 3s. 3d. lb. delivered, or f.o.b.

DINITROCHLORBENZOLE.—Export inquiry. Price £90 per ton, f.o.b.

METANILIC ACID.—Home inquiry. Price quoted, 3s. 7d. lb. 100% basis, carriage paid.

META NITROPARATOLUIDINE.—Small home inquiry. Price 8s. 2d. lb. 100% basis, delivered.

META PHENYLENEDIAMINE.—Export inquiries. Price 4s. per lb. f.o.b.

PARA NITROTOLUOL.—Home inquiry. Price quoted, 2s. 6d. lb., delivered.

The Chemical Stability of Vitamins

Points in a Lecture by Professor Drummond

THE importance of vitamins in relation to public health was emphasised in a lecture on "The Importance of Vitamins" to the Royal Institute of Public Health, in London, on Wednesday, October 24, by Professor J. C. Drummond (Professor of Bio-Chemistry, University College, London). A tendency existed, said the lecturer, for people to regard vitamins as hypothetical, probably due to the fact that, when first discovered, there was an atmosphere of mystery about them. The fact was, however, that they were now clearly defined and comparatively stable bodies. They now knew that vitamins were very much more stable than they formerly believed them to be, and they had passed from the realm of ill-defined substances into the realm of chemical substances possessing a reasonable degree of stability. For instance, Vitamin A, which is contained in cod liver oil, etc., can be heated, under certain conditions, to a temperature of 200° C., without losing any of its activity, and a substance which can survive treatment at that temperature cannot be of a hypothetical or even an ill-defined nature.

After dealing with the sources of vitamins, Professor Drummond said that the effect of a slight deficiency of one or more of these substances on animals or human beings was to bring about a condition which might be called the borderline of disease, and it was his view that a large proportion of our industrial populations were living on this so-called borderline—though they have no definite disease—as a result of deficiency of vitamins in their normal diet. Professor Drummond also called attention to the fact that civilised communities were gradually getting farther away from Nature in regard to their food. This had an important relation to the vitamin question. It was impossible to say generally whether the pasteurisation of milk or the canning of fruit destroyed vitamins, as this depended on the particular process. Though heat did not seriously damage vitamins, oxygen did, and it damaged them more the higher the temperature. Ordinary methods of pasteurisation involved heating, and, to an extent, the admixture of the milk with air, and therefore, destruction would not depend merely on temperature or the admixture with air alone, but on a complication of these factors.

So far they had no reliable quantitative method of estimating vitamins. They were tested by biological methods on small animals, but the conditions of those tests had been well standardised, and they could now estimate within an error of 50 per cent., which was not a big error biologically—*i.e.*, they could say that one was twice as good as another.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, November 1, 1923.

CONDITIONS on the chemical market here this week are patchy, judging from the reports of traders, not all of whom are doing very much business. Some sellers continue to receive a steady flow of inquiries and altogether, though individual orders are small, a fair amount of business is being done. Other firms, however, report little activity. News is current of an improvement in the cotton trade, but whether this will be substantial enough or lasting enough to affect the consumption of textile chemicals remains to be seen.

Heavy Chemicals

Prussiate of soda still attracts little attention, though prices are fairly steady at 5¾d. to 6d. per lb. Hyposulphite of soda is also quiet, with photographic crystals on offer at £14 10s. and commercial at £9 per ton. The demand for caustic soda, both home and foreign, is maintained, and prices are unchanged at from £16 17s. 6d. for 60 per cent. material to £19 7s. 6d. per ton for 76-77 per cent. Bleaching powder is firm and there is a fair market for both branches of trade, £11 5s. per ton still being asked. Saltcake is being called for in steady quantities for export, domestic inquiry, however, still being light; to-day's price is maintained at £4 10s. per ton. No improvement in the position of sulphide of sodium can be reported, demand continuing quiet, though prices are about unchanged from last week at £14 per ton for 60-65 per cent. concentrated and £8 10s. to £9 per ton for crystals. Glauber salts are quiet and easy at £3 15s. per ton. Phosphate of soda, also, is only in moderate inquiry at about £14 10s. per ton. Nitrite of soda is steady at £26 10s. per ton, supplies being taken up in fairly satisfactory quantities. Bicarbonate of soda is steady and in moderate demand at £10 10s. per ton. Alkali keeps firm at £7 10s. per ton for 58 per cent. material, and a quietly steady trade is being put through on home consumption account and also for shipment. Chlorate of soda is in moderate inquiry at 2¾d. per lb. Acetate of soda is rather quiet at £24 per ton. Soda crystals are steady at £5 5s. per ton, but not much business is being done. Bichromate is firm and in quietly active demand at 4½d. per lb.

Caustic potash continues rather quiet but steady at £29 to £29 10s. per ton for 88-90 per cent. material. Carbonate of potash is fairly active, though prices are again easier at £24 for 90 per cent. and £25 per ton for 96 per cent. Yellow prussiate of potash is quiet and prices have a lower tendency at 11½d. per lb. Permanganate of potash is inactive at round 9d. per lb. Bichromate of potash is firm and in fair demand at 5¾d. per lb. Chlorate of potash is unchanged at 3d. per lb.

On a steadier demand for shipment, arsenic is firmly maintained at about £65 per ton, Manchester, for white powdered, Cornish makes, with offers of foreign material at lower rates; the home demand is still slow. Sulphate of copper is still quiet though unchanged at £25 to £26 per ton, f.o.b. Commercial Epsom salts are in fair inquiry at £4 to £4 10s., with magnesium sulphate, B.P., steady at £6 per ton. Nitrate of lead is quiet at £42 per ton. The demand for acetates is not pressing, but with supplies light, prices are very firm. White acetate of lead is offered at £41 and brown at £45, with grey acetate of lime quoted at £22 and brown at £12 10s. per ton.

Acids and Tar Products

Very little business is being done in tartaric and citric acids, though no change in prices from last week can be reported. Tartaric is quoted at 1s. 1¼d. to 1s. 2d. per lb. and citric, B.P., at about 1s. 4½d. per lb. Acetic acid is in fair demand but slightly easier at £46 per ton for 80 per cent. technical and £64 glacial. Oxalic acid is quiet at 5¾d. per lb.

Actual business in pitch is not particularly active; prices are firm, however, at £6 10s. to £7 per ton, Manchester. Creosote oil is rather quiet at 8½d. per gallon. Solvent naphtha attracts little attention at 1s. 2d. to 1s. 3d. per gallon. Carbolic acid is unchanged at 3s. 8d. per gallon for crude and 1s. 2d. per lb. for crystals; demand is quiet though available supplies continue short. The inquiry for naphthalenes shows some improvement; prices are steady at about £20 per ton for refined and £6 to £11 for crude according to grade.

Company News

AYRTON AND SAUNDERS, LTD.—The directors have declared an interim dividend on the 7½ per cent. preference shares less tax, at 4s. 5d., payable forthwith to holders registered noon October 31.

AGUAS BLANCAS NITRATE CO.—An interim dividend is announced at the rate of 25 per cent., less tax, on account of the year 1923, payable on November 30. At the corresponding period last year the interim dividend was the same.

BRUNNER-MOND AND CO., LTD.—The directors announce an interim dividend on account of the current year at the rate of 7 per cent. per annum on the ordinary shares. At the corresponding period last year the interim distribution was at the rate of 7½ per cent.

NORTH BROKEN HILL CO.—At a meeting held on October 30, the agreement was ratified under which the company acquires the interests of the British Australian Broken Hill Co., the purchasers paying £140,625 in cash, and allotting 150,000 shares in the new company.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA, LTD.—The transfer books and register of holders of the 8 per cent. 1st mortgage debentures will be closed from November 1 to November 14, both days inclusive, preparatory to the payment of interest due on November 15.

HUMBER PORTLAND CEMENT CO.—It is announced that the business of this company has been acquired by Messrs. G. and T. Earle, Ltd., Hull. Payment was made to shareholders on October 25, in accordance with the terms of a circular issued on October 1, namely, at the rate of 30s. 3d. per £1 ordinary share.

ALFRED BIRD AND SONS (LTD.).—The net profits for the year ended March 31 last were £80,124, and £57,696 was brought forward, making a total of £137,820. A final dividend of 10 per cent., and a bonus of 6½ per cent. are proposed, making 21½ per cent., free of income tax, for the twelve months, leaving £78,445 to be carried forward.

ERINOID, LTD.—The profit for the year to August 31 last, after allowing for depreciation, etc., was £17,125, and £2,695 was brought in, making £19,820. The directors recommend a dividend of 4 per cent., less tax, at 4s. 9½d.; to general reserve £5,000, leaving £7,480 to be carried forward. The annual meeting will be held at the Institute of Chartered Accountants, Moorgate Place, London, on November 6, at noon.

WALL PAPER MANUFACTURERS, LTD.—The directors announce that the profit for the year to August 31 last is £635,681. After payment of debenture interest and preference dividend they recommend a final dividend of 6 per cent. on the ordinary shares, making 10 per cent. for the year, a dividend of 10 per cent. on the deferred shares, and a transfer to reserve of £100,000, carrying forward £223,088. The general meeting will be called for November 22, and the report and accounts will be sent to the shareholders on November 10. For the preceding year the dividend on the deferred shares was 5 per cent.

Affairs of Becker and Co.

IN the Chancery Division, London, on Friday, October 26, Mr. Justice Tomlin appointed a receiver and manager of Becker and Co. (Limited), the well-known pulp merchants and shippers, on the application of the National Provincial and Union Bank, trustees of the trust deed securing the Debenture-holders and holders of Secured Notes. There was no opposition, the company admitting that it could not continue, and his Lordship granted the application. The announcement created surprise by its suddenness. Registered in 1908, the ramifications of the company are very extensive, for it controls interests in subsidiary companies operating in France, Italy, Norway, Sweden, the United States and Canada. The reason given for the step which has now been taken is the failure of a certain Canadian company to meet its liabilities. Meanwhile, it is reported that Sir Frederick Becker is returning from America, and following his arrival it is hoped that something may be done to alleviate the present position. In the Chancery Division on Wednesday on the application of the National Provincial and Union Bank of England, Ltd., Sir Basil Mayhew was appointed receiver and manager of Charles Marsden and Sons, Ltd., paper manufacturers, which was described as belonging to the Becker Group.

British Industries Fair, 1924

Complementary to the Wembley Exhibition

WHILE the British Industries Fair and the British Empire Exhibition have a common object in the promotion of British trade, their activities are in no way competitive but rather complementary. Participation in the Fair will, as hitherto, be confined to British manufacturers, and admission will be restricted to bona fide trade buyers. The British Empire Exhibition, on the other hand, is for the public, and welcomes participation by any British firm, whether manufacturers, merchants or retailers.

The announcement some weeks ago by the Department of Overseas Trade of the alteration of date in the holding of the annual British Industries Fair for 1924 promises to be thoroughly justified by the results. For the past nine years, the Fair has been held regularly during the latter half of February, occasionally running on into the first week of March. The next, the tenth Fair, will be held two months later, from April 28 to May 9, and the Birmingham Section, instead of being concurrent with or overlapping the London Section as has been the case in previous years, will follow, opening on May 12, and closing on May 23. Before coming to a decision on this question of date, the Department gave the fullest consideration to the views expressed by the exhibitors in the various sections, and, although these opinions naturally differed widely, not only among the distinct trades, but even within the trades themselves, the Department concluded that the weight of argument lay with the later date. It is obvious that the holding of an exhibition on the scale of the British Empire Exhibition outweighs all normal considerations, and that the Department was fully justified in its decision to depart from the usual date.

The Fair in 1924 will have the usual range of sections, including light and heavy chemicals, domestic chemical products, dyes, and scientific and optical instruments.

Examining the precise services and opportunities which the Fair offers the British manufacturer, first and foremost, it brings him into direct touch with the buyer and presents an ever-recurring opportunity for him to show his wares to new buyers, both home and overseas. Even if immediate orders are not received the buyer takes away with him notes of special lines and all particulars necessary for opening business at the moment favourable to his own market. The fact that admittance to the Fair is confined to the *bona fide* buyer by special invitation means that everyone passing the turnstiles is a potential customer. Thus participation is a form of specialised publicity of the very highest value, secured at a moderate cost.

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

LONDON (November 13).—The Commissioners of His Majesty's Works, etc., invite tenders for the supply of soda crystals and soda ash. Forms of tender, etc., may be obtained on application to the Controller of Supplies, H.M. Office of Works, King Charles Street, Westminster, London, S.W.1.

URUGUAY (December 27).—Tenders are invited for the supply of general store requirements of the State Electric Light Works of Montevideo. The list of goods required includes red and white lead, crystallised soda, lubricating grease, muriatic acid, glass flasks, pure glycerine, pure mercury, arnica tincture. Conditions of tender, etc., may be had on application to the Department of Overseas Trade (Room 84). 35, Old Queen Street, Westminster, London, S.W.1. Ref. No. 8893/F.L./G.P.

Tariff Changes

AUSTRALIA.—Hyposulphite of soda from Great Britain and France has now been brought under the Customs Tariff (Industries Preservation) Act and is now liable to "dumping duty." British Portland cement, if freight is less than 4s. 6d. per cask, is also included. Additions to the German goods on the list include salicylic acid and phenolphthalein.

COLOMBIA.—An import duty on salt has been imposed.

ITALY.—The "official value" of certain non terpentless essential oils subject to *ad valorem* duty has been fixed by a Ministerial Decree.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

DEVON CLEANSERS, LTD., 1, Guildhall Chambers, Exeter, cleansing powder manufacturers. (C.C., 3/11/23.) £18 16s. 6d. September 27.

MURRAY, A., and BUTTERWORTH, J. W., trading as THE EXCELSIOR VINEGAR CO., Threlfall Road, Blackpool. (C.C., 3/11/23.) £26 3s. 6d. September 18.

PHOSALINE, LTD., 4, Richmond Road, Derby, manufacturing chemists. (C.C., 3/11/23.) £11 1s. 4d. September 28.

REMINGTON, J. Stewart, The Homestead, Grange-over-Sands, analytical chemist. (C.C., 3/11/23.) £22 13s. October 1.

STANSFIELD, Mr. J. L., 26, Burnley Road, Bacup, chemical manufacturer. (C.C., 3/11/23.) £21 14s. 2d. September 26.

Receivership

ALBY UNITED CARBIDE FACTORIES, LTD. (R., 3/11/23.) R. H. Hoare, of Norfolk House, Norfolk Street, W.C., ceased to act as receiver on June 20, 1923 (Notice filed October 28).

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

BRITISH MAGNESITE CALCINING CO., LTD., London, S.W. (M., 3/11/23.) Registered October 19, mortgage, to bank; charged on lands in Bold and Widnes. *£53,000 1st debentures. March 20, 1923.

GREENHILL AND SONS, LTD., London, E.C., celluloid manufacturers. (M., 3/11/23.) Registered October 20, £50,000 debentures; general charge. *Nil. December 31, 1922.

LEES PAPER STAINING CO., LTD. (M., 3/11/23.) Registered October 15, debenture, to bank; general charge. *Nil. December 30, 1922.

TAYLORS' DRUG CO., LTD., Leeds. (M., 3/11/23.) Registered October 22, £1,000 mortgage, to J. H. Armitage, Hookholm Park, View Crescent, Roundhay, solicitor, and another; charged on 53, Market Place, Heckmondwike. *£104,858 13s. 10d. September 17, 1923.

Satisfactions

BRITISH CYANIDES CO., LTD., London, E.C. (M.S., 3/11/23.) Satisfaction registered October 18, £25,000, registered July 7, 1914.

IPSWICH SANITARY STEAM LAUNDRY CO., LTD. (M.S., 3/11/23.) Satisfaction registered October 19, £1,500 outstanding at July 1, 1901; and £100, registered August 17, 1904.

London Gazette

Notice of Intended Dividend

GREENHALGH, John, Victoria Works, Levenshulme Road, Gorton, Manchester, oil and edible fat merchant. Last day for receiving proofs, November 15. Trustee, A. Yearsley, 27, Brazennose Street, Manchester.

Notice of Dividend

ROWLEY, Albert James, lately carrying on business at Crown Works, Brentford, paint and varnish manufacturer. First and final dividend of 8⅛d. per £, payable November 2, Official Receiver's Office, 29, Russell Square, London, W.C.1.

Companies Winding Up Voluntarily

SEVEN SPAS SOAP PROPRIETARY CO., LTD. (C.W.U.V., 3/11/23.) H. B. Everett, chartered accountant, 3–7, Southampton Street, London, appointed liquidator. Meeting of creditors at 3–7, Southampton Street, Strand, London, W.C.2, at 12.30 p.m., on Monday, November 5. Claims on or before November 22.

SPALDING LAUNDRY CO., LTD. (C.W.U.V., 3/11/23.) W. Willcock, 2, Main Ridge, Boston, appointed liquidator.

YORK ROAD LAUNDRY (WIMBLEDON), LTD. (C.W.U.V., 3/11/23.) F. H. Wilding appointed liquidator.

New Companies Registered

ARMOURITE (LABORATORIES), LTD., 26, Stanley Road, East Sheen, London, S.W.14. Manufacturers of and dealers in soap powders, chemical cleaning and polishing compounds, rubber, vulcanising compounds, etc. Nominal capital, £100 in 1s. shares.

CARLTON BLEACHING AND DYEING CO., Armitage Chambers, Victoria Street, Nottingham. Bleachers, dyers, finishers, etc. Nominal capital, £15,000 in £1 shares.

ECLIPSE OIL CO., LTD., 458, Commercial Road, Portsmouth. Oil and colour merchants; manufacturers, exporters, importers and vendors of oils, colour and paint; fuel, salt, lime, tar, creosote and naphtha merchants. Nominal capital, £3,000 in £1 shares (1,000 7½ per cent cumulative preference and 2,000 ordinary).

FINE CHEMICALS, LTD., Calrow's Works, Bury, Lancs. To acquire a certain patent for invention relating to the manufacture of synthetic resin; manufacturers of and dealers in resin, shellac, oils, paints, varnishes, etc. Nominal capital, £4,000 in £1 shares.

PYORRHOSOL, LTD., 346, Strand, London, W.C.2. Experimental and pharmaceutical chemists; wholesale and retail chemists and druggists, etc. Nominal capital, £5,000 in £1 shares.

BERTRAM THOMAS AND CO., LTD., 28/29, Brooke Street, Holborn, London. Importers of paints, varnishes, painting materials and requisites, etc. Nominal capital, £2,500 in £1 shares (2,000 8 per cent. cumulative preference and 500 ordinary).

WHITE ISLAND (N.Z.) SULPHUR AND FERTILISER CO., 638, Salisbury House, London, E.C. To win, get, quarry, work, calcine, manipulate or prepare for market sulphur, gypsum, guano, ores, metal, mineral or other substances, in New Zealand, Australia or elsewhere. Nominal capital, £100,000 in £1 shares.

Chemical Bankrupt's Application for Discharge

MR. HUGO EDWARD MEYER, merchant, of 44, Chatsworth Road, Brondesbury, N.W., who was the promoter of the Blackamoor Chemicals and Colours, Ltd., and had also helped in the formation of the Foreign Trust, Ltd., was adjudged a bankrupt in June, 1921, and he applied at the London Bankruptcy Court on Friday, October 26, for his order of discharge. The Blackamoor Co. was formed in May, 1918, in the name of the Ink Manufacturing Supply Co., Ltd., and he acted as a director of the company until its liquidation in January, 1921. He attributed his insolvency to losses in connection with that and another company, to interest on loans and to bad trade, in consequence of which he had earned nothing since August, 1920. His object, he said, in forming sundry companies, which were practically one man companies, was to enable him to trade without disclosing the fact that he was foreign by birth and name. His loss in the Blackamoor Co. was £500, paid for shares, £550 cash advanced to or on behalf of the company, and £820 liability as surety. The Official Receiver estimated the total of the unsecured indebtedness at £6,960, and said that a sum of £2 4s. 6d. was realised. On two statutory grounds the Registrar suspended the discharge for two years.